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## CONTENTS.

EDITORIALS :	PAGE.	COAL TRADE NOTES :	PAGE.
Dr. Wedding's Sketch of Sir William Siemens and List of his Writings..	343	Illinois.....	354
In France, Soft Steel is Iron!	343	Maryland.....	354
Funny Mining Bills in the French Parliament.....	343	Ohio.....	354
A Geological Gem.....	343	Pennsylvania.....	354
		Virginia.....	355
		West Virginia.....	355
<b>CORRESPONDENCE :</b>		<b>GENERAL MINING NEWS :</b>	
Mr. Jeans' Statistics of the Production of Steel in the World.....	344	Arizona.....	355
		California.....	355
<b>Ammonium Fluoride as a Blow-Pipe Reagent.....</b>	344	Canada.....	355
<b>Statistics of the American Iron Trade for 1883.....</b>	344	Colorado.....	355
<b>The Ashcroft Furnace-Door and Grate-Bars.....</b>	349	Dakota.....	356
<b>Russell's Improved Process for the Lixiviation of Silver Ores.—II.....</b>	350	Idaho.....	356
<b>The Blasa Suction Condenser and Regulator.....</b>	351	Mexico.....	356
<b>Dynamites with Gunpowder as Absorbent.....</b>	352	Michigan.....	356
<b>The Genesis of Tin-Stone.....</b>	353	Montana.....	356
<b>Pennsylvania Coal Statistics.....</b>	353	Nevada.....	356
<b>The Iron-Work of the Produce Exchange.....</b>	353	Utah.....	358
<b>Furnace, Mill, and Factory.....</b>	354		
<b>Labor and Wages.....</b>	354	<b>FINANCIAL :</b>	
<b>Railroad News.....</b>	354	Gold and Silver Stocks.....	357
		Copper Stocks.....	357
<b>NOTES :</b>		<b>BULLION MARKET.....</b>	357
<b>New Method of Producing Steel Plates.....</b>	344	<b>METALS.....</b>	358
<b>Contracts for the Philadelphia Gas Trust.....</b>	348	<b>IRON MARKET REVIEW.....</b>	358
<b>Colorado Directory.....</b>	349		
<b>Silicon in Pig-Iron.....</b>	349	<b>COAL TRADE REVIEW :</b>	
		New York.....	360
		Philadelphia.....	360
		Pittsburg.....	360
		Buffalo.....	360
		Boston.....	360
		Ohio.....	361
		Milwaukee.....	361
		New Orleans.....	361
		Rail and Canal Freights.....	361
		Statistics of Coal Production.....	361
		Freights.....	361
		<b>Advertisers' Index.....</b>	xii

DR. HERMANN WEDDING, of Berlin, has written a valuable sketch of the life of Sir WILLIAM SIEMENS, and has compiled a full index of his many contributions to the literature of metallurgy, electricity, and engineering.

THE questions, What is steel? and What is iron? which have led to such memorable discussions in this country, are now troubling French iron-masters, and, to a much less extent, the French customs officials. The duty on steel is higher than that on iron, and it has been the practice of the French custom-houses to look upon the property of steel that it hardens when quenched in water as its distinctive characteristic. Everything went on well until what we term in this country "soft steel" was put on the markets of the world in large quantities. French

importers seized the idea of calling this metal "*fer fondu*," translating the German word "*Flusseisen*," and took advantage of the fact that it will not harden to claim that it was iron and not steel, and as such should be admitted under the lower duty. The French iron-masters protested vigorously, and in consequence of their objections the Minister of Commerce submitted the question whether the metal in question was iron or steel to the Comité Consultatif des Arts et Manufactures, who detailed Professor LAN, a very widely known metallurgist, to study the question. M. LAN reported that it was steel, even if it did not harden; but still the customs officials insisted on their classification, and the hardening test as its basis. Thus, for the present, in France, soft steel is iron!

THE French mining public is just now agitated by the introduction in the French parliament of a series of bills that well illustrate what curious remedies are seriously proposed for real or imaginary evils. One bill actually contains a project looking to the acquisition of all the mines in France by the state. Unfortunately, the accounts that reach us do not contain any details concerning the proposed measure, simply combating the plan by general arguments, the bearing of which may be easily imagined. A second bill calls for the restriction of working hours to eight. It is urged against it that miners in France do not actually work more than eight hours, even less when work is to be driven, and only six hours in wet ground. A third project, which has since been proposed, relates to the creation of a "*tribunal de prud'hommes mineurs*," or a jury consisting of an equal number of miners and employers, which is to decide cases formerly brought before a justice of the peace. It is urged against this law that, first of all, the creation of such a tribunal is not necessary, since the cases brought up before it are not frequent. In the Anzin District, with 16,000 workmen, there have been only five during as many years; in the Loire District, in which 10,000 miners are employed, and in the Montceau and Brossac districts, with as many more, there has not been a single case in three years. It is insisted, furthermore, that, in the case of a strike or a lock-out, the tribunal will be in the position of a party judging its own case.

Another project brought forward is the election by the miners of delegates whose mission is to act in co-operation with the government mining engineers in examining the character of the work done and in investigating the causes of accidents. In conjunction with this, there are four different bills to make compulsory the creation of a relief fund. The contributions to be made by miners range from 3 to 6 per cent of their wages. How little the actual state of affairs is understood is shown by these proposals of the would-be friends of the miners. Out of the total number of miners in France of 110,000, 30,000 are employed in mines whose management bears alone the entire cost of maintaining a relief fund, without any contribution whatever from the men; 10,000 employes of other mines pay only two per cent; and there is not a single mine in France that demands more than three per cent from its miners. The Anzin Company, which in 1882 mined 2,241,992 tons of coal, spends out of its own treasury 1,388,052 francs, and the Liévin Company, producing 432,600 tons, gives a gratuity of 281,364 francs.

THAT careful geological study of the formation of mineral veins is thoroughly appreciated, is attested by the fact that those who are not even observers of ordinary intelligence feel called upon to indulge in theories and generalities. Imitation is the sweetest of flattery, and yet we doubt whether those of our geologists who have won laurels by recent research will glory in a compliment when it takes the form that it has assumed in the case of a mine superintendent in Colorado. Still, we feel unable to resist the temptation of quoting from his annual report, though we are charitable enough to suppress a name that might otherwise be snatched from obscurity. He shall not awake and find himself famous. We step aside to let Mr. T. McE. talk for himself and reveal himself in all his glory:

"We started up with a good force of men on a shaft already 30 feet deep, and containing iron, silver, lead, and gold in a semi-liquid state or chloride form. At 33 feet, we struck first water, and consequently struck our first mineral with metallic luster caused by precipitation, and we parted company with iron, silver, chlorides, etc. . . . The vein material is made up of quartz boulders, granite boulders, and the usual gouge or gouge found in all true fissure-veins. The westerly or hanging-wall is porphyry, the easterly wall is granite and 'calico rock' or 'pudding rock,' so called by miners on account of its resemblance to those articles. The boulders referred to in the foregoing are of various sizes, from that of a pea to the dimensions of a barrel, and generally carry mineral in either a scaly form, or disseminated through the rock. The pride taken by miners in the possession of a vein with boulder formation arises from the fact that those boulders, or the matter composing them, was thrown up from the bowels of the earth at about the time the cleavage or fissure was made, accompanied by minerals that in the process of cooling settled to their proper level, the iron uppermost, the gold, silver, copper, etc.,

taking their respective stations as we find them in mining, according to their specific gravity. Hence in the best of mines, toward the surface, frequently only a trace of the royal metals are found. . . This property is located on what is generally known as the 'contact,' and as our government mineralogists have written this up, I will touch it lightly. The term contact is derived from the junction of granite and porphyry, the former being the older formation, and the latter being formed by volcanic action to such an extent that it was one great molten mass; the crust formed on top cooled, and as this cooling progressed, the heavy metals, chemicals formed, and in their nature came together, when, by their action one on the other, they were struck by magnetic currents, rending the crust (of the earth) already forming, and opening fissures into which settled the heavy metals into this molten mass. Thus we find N. W. and S. E. fissure-veins discolored as if by fire, while the easterly and westerly veins caused by volcanic action are generally free from these stains: hence the motion of this 'sea' against these granite walls, for ages perhaps, had deposited the weighty matter on the 'contact,' for once touching there, the cooling influences of the granite held it in place."

If it were possible to create a feeling of surprise after such an ardent burst of plutonism, one might be thrilled by the following passage in which our great Colorado geologist distinctly leans to the heresies of the Neptunists:

"When deep enough, the fissure will be found to contain mineral from wall to wall. Why? Because all matter passed through in sinking was lead and silver-stained, leaving assay value behind of \$36 to \$60 in silver, and 34 to 60 per cent of lead, with a strong trace of gold. These royal metals, settled by the action of water from above, were carried down to such depth until the vein-matter became solid. When this vein-matter solidifies, accompanied by a current of water from below stronger than the downward action of the water from and adjacent to the surface, there you will find your minerals. Proofs of this can be easily shown by placing a silver dollar in a basin of water and keeping it continually agitated. The water will in time take up the silver or any metal."

The report bristles with such gems, but we refrain. *Du sublime au ridicule il n'y a qu'un seul pas.*

#### CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Mr. Jeans's Statistics of the Production of Steel in the World.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Allow me to call your attention to an error in your last issue, in the statistics by Mr. Jeans on the World's Production of Iron and Steel. In the table giving the production of steel rails from ingots, the figures for the United States are, for 1882, 1,191,883 tons, and for 1883, 1,119,576. In your issue of February 2d, on the authority of Mr. Swank, you give the very same figures as the production of steel rails from domestic ingots, excepting that in the product for 1882 the amount is 1,191,883; the difference probably being a typographical error. Will you be kind enough to inform your readers whether in Mr. Jeans's table all of the figures there given refer to rails, and not ingots, or whether merely the figures opposite the United States are incorrect. CHARLES A. SCHAEFFER.

CORNELL UNIVERSITY, ITHACA, N. Y., May 3.

[Our correspondent is right and Mr. Jeans is evidently wrong. As a reference to the official figures just published by Mr. James M. Swank, printed elsewhere, will show, the United States produced in 1883 and 1882, 1,654,627 and 1,696,450 net tons respectively of ingots, or 1,477,345 and 1,514,688 gross tons respectively. So far as we have been able to check them, Mr. Jeans's estimates of the other countries would refer to steel ingots, not rails.—ED. E. AND M. J.]

NEW METHOD OF PRODUCING STEEL PLATES.—Dr. Henry Muirhead, President of the Physiological Society of Glasgow, has recently brought before that body some particulars of a method of manufacturing steel plates for shipbuilding and boiler-making purposes that is of much interest, although its leading feature is not a novel one. It is the invention of Mr. Joseph Whitley, of Leeds, who has erected works for prosecuting the manufacture. Briefly describing the process, Dr. Muirhead said, a hollow metal cylinder, lined with ganister or other brick, revolves at high speed, the axis being horizontal. A gutter or rhone perforated with holes passes into the interior, along its whole length. Into this gutter is poured molten mild steel, which, escaping through the holes, is carried around by the swiftly revolving case, and is formed into an inner cylinder of steel an inch or more in thickness. The cylinder, while still hot, is drawn, cut across by means of a saw, put into a rolling-mill, and rolled to the length and thickness required. In his communication to Dr. Muirhead on the subject, Mr. Whitley wrote as follows: "Suppose I wish a plate for shipbuilding; then, given a mold 5 feet in diameter and 5 feet long, in it I cast a cylinder an inch thick. This, when taken out and cut, is fully 15 feet long and 5 feet broad. It is then rolled down to half an inch in thickness. Such a plate is then 30 feet long and 5 feet broad. The present mold is 9 feet long and 5 feet in diameter. With it, yesterday, Friday, 7th March, I successfully cast a mild steel shell weighing about 30 cwt."

#### AMMONIUM FLUORIDE AS A BLOW-PIPE REAGENT.

Written for the Engineering and Mining Journal by Prof. N. W. Lord, E.M., Ohio State University, Columbus, Ohio.

The use of bisulphate of potassa and fluor-spar as a reagent for developing the flame coloration of boron is well known; but the alkali present prevents the application of the method for liberating some other bodies in the same way. I find fluoride of ammonium, on the contrary, has all the value of fluor-spar as a source of fluorine, admits of much easier application, and is a most useful reagent for detecting the alkalies, boron, and other similar bodies in their mineral combinations. The method of using the reagent is simple. For testing feldspar or similar silicates, a little of the powdered mineral is mixed with this reagent, then placed on a piece of platinum, and moistened with sulphuric acid; the mixture allowed to stand a few moments, or else gently warmed, taken upon a loop of platinum wire, and tested either in the blow-pipe flame or in a Bunsen burner, being dried a little on the wire first. The alkali flame is nearly as well shown as with the pure salts. As the fluoride of ammonium is permanent, is easily obtained free from alkalies and boron, and can be kept indefinitely in a small wooden box, it is always easy to use.

As a test for boron, the reaction is of surprising delicacy. The fact that the fluoride of boron is volatile at a temperature far below that required for alkalies permits thus its detection in borax or any alkaline compound. To a drop of sulphuric acid, placed on a platinum crucible cover, a few grains of the fluoride should be added, and then the mineral (powdered) to form a paste. This is taken as before described, as a platinum loop. It should be heated gently until it stops "sputtering" from escape of free acid and water (but on no account heated to redness), then brought not *in*, but *near*, the lower part of the flame of a Bunsen burner or a good blow-pipe flame. A bright green coloration is at once given untinged by soda yellow. The coloration is, of course, evanescent, and disappears before the assay is red-hot. A little practice is needed to find the right part of the flame, to get the right heat, and at the same time to draw the volatile boron compound into the heated zone.

This reaction showed boron very strongly in all the specimens of tourmaline tested. With a hand spectroscopic, the application of this method gives instant proof of the existence of boron, potassa, soda, and lithia, even in very small traces in rocks.

Borax treated in this way gave a bright green flame, almost like copper.

#### STATISTICS OF THE AMERICAN IRON TRADE FOR 1883.

By James M. Swank, Secretary of the American Iron and Steel Association.

Review of the Domestic Iron Trade in 1883 and during the First Four Months of 1884.

Since the publication of my last annual report, on the 1st of May, 1883, the unsatisfactory condition of the American iron trade as it then existed has not improved. It has steadily grown worse, but to this statement must be added the important qualification that the trade has escaped falling into that state of apprehension, stagnation, and hopelessness which successively characterized it in the years immediately following the panic of 1873. There have been, it is true, many financial failures since the beginning of 1883, but a very large proportion of these were due to other causes than a decreased demand and a decline in prices. Enterprises undertaken in good times with insufficient capital, and enterprises that are badly managed, are almost sure to fail when trade is dull.

Looking back upon the year 1883, it can be said that throughout its entire course the reactionary influences of 1882 were continued, and in an intensified degree; but it can also be said that production in all its branches, except that which embraces iron and steel rails, did not greatly vary from that of 1882; that consumption kept even pace with production in all lines; and that prices receded slowly and not rapidly. If the decline in prices had been rapid and concentrated in a brief period, and not, as it was, distributed evenly throughout the year, general disaster would have been certain. Another ameliorating influence is found in the fact that, as a rule, the price of finished products and raw materials receded uniformly—the prices of ore and fuel maintaining an equitable relation to the price of pig-iron, and the prices of pig-iron to the prices of rolled iron and steel. The only noteworthy exception to the general adjustment of prices on a lower plane was furnished by the anthracite coal producers, who scarcely recognized the decline that had taken place in the prices of pig-iron. If the policy of maintaining high prices for anthracite coal is insisted upon, the production of anthracite pig-iron must steadily decline. As our statistics will show, it experienced a serious decline in 1883, whereas the production of bituminous pig-iron increased in the same year. With the exception mentioned, the decline in prices was equitable and compensatory; the inevitable shrinkage was evenly borne by all branches. We are glad to be able to add that wages were not greatly reduced, and that such reductions as it was found necessary to make met with little resistance; nor were many workmen discharged because there was nothing for them to do. All in all, the past year was not a year to be pointed to hereafter as one of general disaster to our iron and steel industries, nor of panic, nor of overloaded markets, nor of serious decline in consumption, nor of sudden collapse in prices; but it was, nevertheless, a year of only moderate prosperity, even of less prosperity than its predecessor had brought, and as such it must pass into history.

With the close of 1883, the decline in the prices of iron and steel was partially arrested, and the quotations of December have since been but slightly reduced in some lines and in others have been fairly steady. The demand since the 1st of January has, however, been sluggish, and indications point to an aggregate production of iron and steel in 1884 that will be less than that of 1883. The demand for steel rails, and for iron and steel for cars and locomotives and for bridges and other structural purposes, is less than it was a year ago, and probably less than it was six months ago. The shrinkage in railroad building, which will be more marked in 1884 than in 1883, must correspondingly affect the consumption of heavy iron and steel products. It is perhaps too soon to estimate



closely the effect in 1884 of the existing business reaction upon the minor uses of iron and steel—upon the consumption of hardware, tools, and implements of all kinds, machinery, stoves, and other castings, wire for fencing, wagons, and carriages, etc.; but it is significant that the farmers, who consume fully one half of all the iron and steel that is not consumed by the railroads, have a large surplus of last year's grain crop still on hand, and that, in consequence, the price of wheat has recently been lower than at any time since 1878, while the prices of other agricultural products have also declined. If the prices of wheat and other agricultural products are exceptionally low, the demand for iron and steel for the uses of the farm can not be large. If the farmers are not prosperous, the country at large can not be. Much will, of course, depend upon the new harvest at home and upon the coming crops abroad, but in the mean time the year will reach and pass its culminating point.

There is, however, a more hopeful view. The minor uses of iron and steel in this country, with its population of fifty-eight millions, require, even in dull times, a large aggregate tonnage of pig-iron and of iron and steel in other primary and secondary stages of manufacture, and these minor uses are naturally extended with an increase in population. Not even low prices for wheat can destroy them or entirely arrest their extension. Nor is the outlook for the manufacturers of steel rails wholly unfavorable. The 120,000 miles of railroad already built must alone annually require a large quantity of rails. It is estimated by the *Railroad Gazette* that about 700,000 tons of rails were used in this country in 1882, and about 650,000 tons were used in 1883 for renewals and for new second tracks and sidings of old roads. Nor can the consumption of iron and steel for cars and locomotives be long interrupted when there are so many miles of railroad to be maintained in a fair state of equipment. The country's need of iron and steel for bridges and buildings must continue. If the supply of the home market for iron and steel can be kept chiefly in the hands of our own people, as it now is, the country's ordinary requirements for these articles in both heavy and light forms will annually furnish a vast amount of business to our iron and steel establishments. These facts and favorable probabilities are entitled to careful consideration, and to be weighed with the less favorable facts above presented, namely, the decline in railroad building and the low prices which the farmers are now receiving for their products.

There is one important consideration, however, that must be taken into account in any attempt that may be made to peer into the future of our iron and steel industries. The events of the last few years have dispelled the illusion from the minds of all but the most thoughtless that these industries or any other American industries can be indefinitely developed. There is a limit beyond which all attempts to force the development of mechanical or agricultural industries must be attended with serious loss. A country can consume and pay for just so much and no more of any product, and any surplus of that product that it may have for the supply of other countries can be disposed of, if disposed of at all, only in conformity with the same law. European countries are compelled to bend to the requirements of this law, and this country can form no exception to it. In times past, we have been too prone to believe that our industrial opportunities were boundless, and that our industrial activity could, therefore, never be too pronounced or aggressive. The panic of 1873 suddenly challenged the correctness of this impression, and the years which immediately followed were years of humility and not of boasting. The year 1879, however, brought another period of industrial excitement, and with it a partial revival of the old belief in our industrial omnipotence. We had at last an abundance of good money; why should there not be unlimited activity and unlimited prosperity? The bounding prosperity which 1879 ushered in lasted only until 1882, since the beginning of which year the country has been gradually settling down to the industrial position it now occupies, which is midway between great exaltation and great depression, and which, joined to our experience under the panic of 1873, must virtually end the illusion that this country can not produce too much of any commodity. With this illusion dispelled; with capital taught that it need not make what the people can not buy; with would-be farmers taught that we can produce more wheat than we can sell; with immigration narrowed to reasonable bounds, because labor in this country is already in excess of the demand for it; with our mechanical industries so fully developed and so skillfully managed that competition will be certain and endless, it may reasonably be expected that excited markets and inflated prices will be things of the past, while low prices will help to hold in check the evil of overproduction. Steadiness in demand and supply is what the country needs and what it has conspicuously lacked in recent years. This means a slower growth than accompanies periods of industrial excitement, but a slow growth is a healthy growth. We shall probably have a slow growth for some time to come, even if the importation of foreign goods be not encouraged by a further reduction of duties.

This leads to the remark that it is the unanimous testimony of business men that our general industrial condition would be much better than it now is if the nightmare of a reduction in the tariff had not rested upon the country during the past eighteen months. The mere agitation of the question of a reduction of duties, in Congress and in the columns of newspapers, although not always resulting in a change in the rates, is injurious to all productive industry, as it necessarily makes future demand and future prices uncertain. It may readily be granted that an industrial reaction from the extraordinary activity which succeeded the long period of hard times, during which period the country gradually worked its way down to specie payments, was inevitable; but this natural reaction would not have been so sharp as it has been if it had not been accompanied by the agitation for a reduction of duties. This agitation has lasted, as we have said, for eighteen months, or ever since the Tariff Commission presented its report (which was followed by the enactment of the present tariff), and since the almost simultaneous election of the House of Representatives of the present Congress. It will continue as long as the present Congress is in power. If we could have a law that would prohibit changes in the tariff oftener than once in every ten years, the industries of the country would rest upon a more stable foundation than they now do. It is earnestly to be hoped that, after the present agitation has run its course, all the industries of the country will be permitted to enjoy a long period of rest from legislative interference.

Meanwhile the fact is worthy of notice that in Europe the industrial situation is not even so favorable as it is with us. The iron and steel industries of almost every European country are especially depressed at the present time. If there has been a tendency to overproduction of iron and steel on this side of the Atlantic, the same tendency has been manifested on the other side, and there, as here, the results are seen in low prices and idle establishments. The wonderfully productive power of modern machinery as an influence in creating glutted markets has not yet been sufficiently recognized or guarded against in any manufacturing country.

THE PRODUCTION OF IRON AND STEEL IN 1882 AND 1883.

The production of iron and steel in the United States in 1883 is given in the following table, in comparison with that of 1882:

PRODUCTS.	Net tons.	
	1882.	1883.
Pig-iron.....	5,178,122	5,146,972
All rolled iron, including nails and excluding rails.....	2,285,957	2,283,920
Bessemer steel rails.....	1,438,155	1,286,554
Open-hearth steel rails.....	22,765	9,186
Iron rails.....	227,874	64,954
Kegs cut nails and spikes, included in rolled iron.....	6,147,097	7,762,737
Crucible steel ingots.....	85,089	80,455
Open-hearth steel ingots.....	160,542	133,679
Bessemer steel ingots.....	1,696,450	1,654,627
Blooms from ore and pig-iron.....	91,293	74,758

There was a remarkable correspondence in the production of pig-iron, rolled iron, crucible steel ingots, and Bessemer steel ingots in 1882 and 1883; a marked decline in 1883 in the production of all kinds of rails, open-hearth steel ingots, and blooms from ore and pig-iron; and a surprising increase in 1883 in the production of cut nails and spikes.

PRICES OF IRON AND STEEL IN 1883 AND 1884.

The following table will show the range of prices for all leading iron and steel products from January, 1883, until the close of April, 1884. Monthly quotations are given, averaged from weekly quotations. The prices quoted are for a ton of 2240 pounds, except for bar iron and nails, which are quoted by the pound and the keg respectively:

MONTHS	Old T. rails, at Philadelphia.	Steel rails, at mills, in Pennsylvania.	No. 1 anthracite foundry pig-iron, at Philadelphia.	Gray forge pig-iron, at Philadelphia.	Common bar iron, at Pittsburg. Per pound	Nails (gross price), at Pittsburg. Per keg.	Gray forge pig-iron, Lake or mixed, at Pittsburg.
January, 1883.....	\$26.50	\$40.00	\$25.00	\$21.00	2-2c.	\$3.40	\$21.00
February.....	26.00	39.50	24.50	20.50	2c.	3.40	20.50
March.....	25.00	39.00	24.00	20.00	2c.	3.40	20.00
April.....	24.50	38.50	23.50	20.00	2c.	3.30	19.50
May.....	23.50	38.00	22.00	19.50	2c.	3.10	18.50
June.....	22.00	38.00	21.00	19.00	2c.	3.00	18.50
July.....	22.50	38.00	21.50	19.00	2c.	3.00	18.50
August.....	23.50	38.00	22.00	19.00	2c.	3.00	18.50
September.....	23.25	37.00	21.50	18.75	1-9c.	2.75	18.50
October.....	23.00	35.00	21.00	18.50	1-8c.	2.60	18.50
November.....	23.00	34.50	21.00	18.00	1-8c.	2.50	18.00
December.....	22.50	34.00	20.50	18.25	1-8c.	2.40	18.00
January, 1884.....	23.00	34.00	20.50	18.00	1-8c.	2.60	18.00
February.....	22.75	34.00	20.50	18.00	1-8c.	2.50	17.75
March.....	22.00	34.00	20.00	18.00	1-8c.	2.35	17.50
April.....	22.00	34.00	20.00	18.00	1-8c.	2.35	17.50

The decline in prices that is presented by this table is very great, and it is suggestive of the decline which occurred during the panic years. Indeed, we have already gone below the lowest panic prices for steel rails, and in pig-iron, bar iron, and nails we are uncomfortably close to the prices of 1878, which was the darkest of the panic years.

The price of Connellsville coke on cars at the ovens fell from \$1.35 per net ton in January to 90 cents in midsummer, from which there was a recovery to \$1 in August, which was maintained until the close of the year, after which there was a decline to 90 cents. On the 1st of April last, the price was advanced to \$1.10. The prices of best qualities of Lake Superior iron ore at Cleveland fell \$1 per ton during the year, and since the 1st of January last they have still further declined. Season contracts for Lake Superior ore were made in 1883 largely in April and May. In 1884, they have been made chiefly in February. The following table shows the prices for season contracts for both years:

KINDS OF ORE.	Gross tons.	
	1883.	1884.
Republic.....	\$7.50	\$6.00
West Republic.....	7.50	6.25
Barnum, Cleveland, and Lake Superior specular.....	6.50	5.75
Chapin and Menominee.....	6.00	5.25
Hematites.....	4.75	4.50

THE PRODUCTION OF PIG-IRON IN 1883.

The production of pig-iron in the United States reached its highest point in 1882, when 5,178,122 net tons, or 4,623,323 gross tons, were produced. In 1883, our production of pig-iron was very nearly as large as in 1882, being 5,146,972 net tons, or 4,995,510 gross tons. (A net ton is 2000 pounds, and a gross ton is 2240 pounds.)

The following table gives in net tons the production of pig-iron in the last five years, classified according to the fuel used :

Fuel used.	1879.	1880.	1881.	1882.	1883.
Bituminous .....	1,438,978	1,950,205	2,268,264	2,438,078	2,689,650
Anthracite .....	1,273,024	1,807,651	1,734,462	2,042,138	1,885,596
Charcoal .....	358,873	537,558	638,535	697,906	571,726
Total .....	3,070,875	4,295,414	4,641,564	5,178,122	5,146,972

It is necessary to explain that in the fuel classification here given there is included under the head of "anthracite" all the pig-iron made with mixed anthracite coal and bituminous coke. For several years, this mixture of fuels in the blast-furnace has become more and more popular in those iron-producing sections of the country that are usually regarded as tributary to the anthracite coal region, and even the use of coke alone as a blast-furnace fuel has made some headway in these sections. Of the production of 1,885,596 net tons of anthracite pig-iron in 1883, no less than 920,142 tons, or nearly one half of the total quantity, were produced with mixed fuel. With the opening up of a new coke-field in the Clearfield region of Pennsylvania, and the continuance of the present disparity in the prices of coke and anthracite coal, it may reasonably be expected that the use of the latter fuel in the blast-furnace will from year to year decline relatively with that of coke, and probably absolutely.

Notwithstanding the admixture of coke with anthracite coal, the production of anthracite pig-iron in 1883, as compared with that of 1882, decreased 156,542 net tons. Upon the other hand, the production of bituminous pig-iron, which includes pig-iron made with uncoked coal as well as that made with coke, increased 251,572 net tons in 1883, as compared with 1882. The production of charcoal pig-iron steadily increased from 1878, when it amounted to 298,399 net tons, to 1882, when it amounted to 697,906 tons; but in 1883 it declined to 571,726 tons—a loss in one year of 126,180 net tons.

Our production of pig-iron in 1883 was obtained in twenty-six States and one territory (Utah), but in 1882 only twenty-four States and one territory (Washington) produced pig-iron. The two States which dropped out of the list in 1883 were Vermont and North Carolina. The following table shows the production of pig-iron by States in 1883, in the order of their prominence :

STATES.	Net tons.	STATES.	Net tons.
Pennsylvania.....	2,638,891	Georgia.....	45,364
Ohio.....	679,643	Colorado.....	24,680
New York.....	331,964	Connecticut.....	19,976
Illinois.....	237,657	Massachusetts.....	10,760
Michigan.....	173,185	Indiana.....	9,950
Alabama.....	172,465	Minnesota.....	8,000
Virginia.....	152,907	Oregon.....	7,000
New Jersey.....	138,773	California.....	5,327
Tennessee.....	133,963	Maine.....	4,400
Missouri.....	103,296	Texas.....	2,381
West Virginia.....	88,398	Washington Territory.....	2,317
Kentucky.....	54,629		
Wisconsin.....	51,893	Total.....	5,146,972
Maryland.....	49,153		

Of the total production of pig-iron in 1883, Pennsylvania produced over 51 per cent. Ohio comes next, with over 13 per cent. By reference to elaborate tables in the latter part of this report, it will be seen that Pennsylvania increased its production 189,635 tons from 1882 to 1883. In the same period, Ohio reduced its production 19,257 tons; New York, 84,192 tons; Illinois, 122,750 tons; Michigan, 37,010 tons; New Jersey, 38,032 tons; Tennessee, 3639 tons; Missouri, 10,348 tons; Wisconsin, 33,966 tons; Kentucky, 11,893 tons; and Maryland, 5371 tons. Georgia, Colorado, Connecticut, Massachusetts, Maine, Indiana, Minnesota, and Oregon made but little change in their production. Of the States which, in addition to Pennsylvania, increased their production in 1883, Virginia comes first, with an increase from 87,731 tons, in 1882, to 152,907 tons in 1883. Alabama also made a notable increase, its production being 112,765 tons in 1882 and 172,465 tons in 1883. West Virginia increased its production from 73,220 tons to 88,398 tons; Texas, from 1321 tons to 2381 tons; and California, from 987 tons to 5327 tons.

The following table shows the production of pig-iron in Pennsylvania and Ohio, by districts, in the last four years :

DISTRICTS.	Net tons of 2000 pounds.			
	1880.	1881.	1882.	1883.
<b>Pennsylvania.</b>				
Lehigh Valley anthracite.....	544,987	560,190	609,338	575,987
Schuylkill Valley .....	306,928	309,049	342,701	337,433
Upper Susquehanna .....	168,128	125,785	201,367	165,629
Lower Susquehanna .....	217,886	218,329	300,240	337,419
Shenango Valley coke.....	215,313.	198,968	264,078	290,069
Alleghany County coke.....	300,497	385,453	358,840	592,475
Miscellaneous coke.....	286,007	341,104	322,717	301,564
Charcoal.....	43,374	51,908	49,975	38,315
Hanging Rock coke.....	60,316	77,500	77,364	82,455
Mahoning Valley coke.....	226,877	245,737	258,478	244,265
Hocking Valley coke.....	85,719	88,146	78,770	48,439
Miscellaneous coke.....	232,105	232,994	225,634	263,956
Hanging Rock charcoal.....	64,854	61,487	55,546	38,134
Miscellaneous charcoal.....	4,336	4,682	3,108	2,394
<b>Ohio.</b>				

The following table shows the production of speigeleisen in the United States since 1875. The figures given are included in our statistics of pig-iron production :

Years.	Net tons.	Years.	Net tons.
1875.....	7,832	1880.....	19,603
1876.....	6,616	1881.....	21,086
1877.....	8,845	1882.....	21,963
1878.....	10,674	1883.....	24,574
1879.....	13,931		

The product of 1883 was made by the New Jersey Zinc and Iron Company, the Cambria Iron Company, Carnegie Brothers & Co., Limited, the Lehigh Zinc and Iron Company, and the Colorado Coal and Iron Company. During 1883, the Passaic Zinc Company built a furnace, 40 feet by 10 feet, in Hudson County, New Jersey, for the production of speigeleisen.

It was put in blast on March 1st, 1884. Every indication points to a material increase in our production of speigeleisen in the early future. As in the past, both native and foreign ores will be used.

The following table gives the number of completed furnaces in the United States at the close of each of the twelve years from 1872 to 1883, allowance being made in each year for furnaces abandoned or torn down to make room for more modern structures :

1872.....	612	1876.....	712	1880.....	701
1873.....	657	1877.....	716	1881.....	716
1874.....	693	1878.....	692	1882.....	687
1875.....	713	1879.....	697	1883.....	683

During 1883, there were built in the United States 13 new furnaces—1 in New Jersey, already mentioned, 4 in Virginia, 1 in West Virginia, 1 in Texas, 5 in Alabama, and 1 in Tennessee. The last-named furnace (Citico), located at Chattanooga, was successfully blown in on the 4th of April last. During 1883, there were 17 furnaces either burned or abandoned—2 in New York, 6 in Pennsylvania, 7 in Ohio, 1 in Alabama, and 1 in Maryland.

At the close of 1882, there were 417 furnaces in blast and 270 out of blast, and at the close of 1883 there were 307 in blast and 376 out of blast. These figures show 110 fewer furnaces in blast at the close of 1883 than at the close of 1882. At first sight, this great change would seem to indicate a greatly reduced capacity of production at the beginning of 1884, as compared with the beginning of 1883; but this would not be a correct conclusion, as few of our largest and best-appointed furnaces were blown out in 1883. Of the 110 furnaces that were in blast at the close of 1882 and out of blast at the close of 1883, a large majority were small and many were charcoal furnaces.

At the close of 1883, there were 19 blast-furnaces in course of erection in the United States, as follows: Pennsylvania, 4 anthracite and 2 bituminous; Virginia, 2 bituminous; Alabama, 1 bituminous; Ohio, 3 bituminous; Michigan, 1 charcoal; North Carolina, 1 bituminous; Colorado, 3 bituminous; Utah Territory, 1 charcoal; Oregon, 1 charcoal. Since January 1st, two of these furnaces have been completed and blown in. In addition to the above, there was under construction at Croton Falls, New York, a furnace for the production of wrought-iron and steel directly from the ore.

The following table shows in detail the number of furnaces in blast and out of blast at the close of 1882 and 1883, in each of the States and territories. On April 1st, 1884, the number of furnaces in blast had been slightly reduced as compared with January 1st :

STATES AND TERRITORIES.	December 31, 1882.			December 31, 1883.		
	In blast.	Out of blast.	Total.	In blast.	Out of blast.	Total.
Maine.....	1	...	1	...	1	1
Vermont.....	...	1	1	...	1	1
Massachusetts.....	2	3	5	3	2	5
Connecticut.....	7	2	9	4	5	9
New York.....	37	20	57	28	29	55
New Jersey.....	13	6	19	8	12	20
Pennsylvania.....	185	92	277	142	129	271
Maryland.....	11	12	23	8	14	22
Virginia.....	15	23	38	12	30	42
North Carolina.....	...	5	5	...	5	5
Georgia.....	4	2	6	3	3	6
Alabama.....	12	3	15	14	5	19
West Virginia.....	5	6	11	6	6	12
Kentucky.....	9	9	18	5	13	18
Tennessee.....	14	5	19	9	11	20
Texas.....	1	...	1	1	...	2
Ohio.....	62	35	97	39	51	90
Indiana.....	2	1	3	2	1	3
Illinois.....	9	7	16	4	12	16
Missouri.....	3	14	17	2	15	17
Michigan.....	14	15	29	12	16	28
Wisconsin.....	8	7	15	5	10	15
Minnesota.....	1	...	1	...	1	1
Colorado.....	1	...	1	1	...	1
Utah Territory.....	...	1	1	...	1	1
Oregon.....	1	...	1	1	...	1
California.....	...	1	1	...	1	1
Washington Territory.....	...	...	...	...	1	1
Total.....	417	270	687	307	376	683

The following table shows the number of furnaces in the United States in and out of blast at the close of 1883, as compared with the close of 1882, separated according to the fuel used :

KIND OF FUEL.	December 31, 1882.			December 31, 1883.		
	In blast.	Out of blast.	Total.	In blast.	Out of blast.	Total.
Bituminous.....	127	83	210	105	116	221
Anthracite.....	161	64	225	118	104	222
Charcoal.....	129	123	252	84	156	240
Total.....	417	270	687	307	376	683

The following table shows the quantity of each kind of pig-iron held in stock by the furnace owners or their agents at the close of the last four years :

KIND OF FUEL.	Net tons.			
	Dec. 31, 1880.	Dec. 31, 1881.	Dec. 31, 1882.	Dec. 31, 1883.
Bituminous.....	184,626	36,495	157,196	171,802
Anthracite.....	175,862	90,351	107,259	178,020
Charcoal.....	98,170	84,050	165,239	183,978
Total.....	458,658	210,896	429,694	533,800



The territorial distribution of all the stocks at the close of 1883 is given in the following table :

DISTRICTS.	Net tons of 2000 pounds.			
	Anthracite.	Charcoal.	Bituminous.	Total.
New England, New York, and New Jersey.....	74,300	29,644	.....	103,953
Pennsylvania.....	90,211	11,336	85,257	195,804
Ohio.....	.....	25,221	47,915	73,136
States south of Pennsylvania, Ohio, and Missouri.....	4,500	52,541	34,153	91,194
Western States.....	.....	65,236	4,477	69,713
Total.....	178,020	183,978	171,802	533,800

The consumption of pig-iron in the United States in 1883 can be approximately determined : We produced 4,595,510 gross tons of pig-iron, and imported 322,648 tons, to which must be added 383,655 tons of domestic pig-iron and 14,802 tons of foreign pig-iron held in stock at the beginning of 1883, giving a total supply of 5,316,615 tons. From this quantity, must be deducted 476,607 gross tons of domestic pig-iron and 5268 tons of foreign pig-iron held in stock at the close of 1883, or a total of 481,875 tons, leaving 4,834,740 tons as the probable consumption of 1883. In recent annual reports, we have estimated in a similar manner the consumption of pig-iron in 1881 at 4,992,565 gross tons, and the consumption of 1882 at 4,963,278 tons. We now find the probable consumption of 1883 to have been 4,834,740 tons. The coincidence in the estimated quantity of pig-iron consumed in each of the last three years will not pass unnoticed.

PRODUCTION OF IRON AND STEEL RAILS IN 1883.

The production of all kinds of rails in 1883 was as follows, in net tons, compared with the production of 1880, 1881, and 1882 :

Kind of Rails.	1880.	1881.	1882.	1883.
Iron rails.....	433,762	488,581	227,874	64,954
Bessemer steel rails.....	854,460	1,330,302	1,436,155	1,286,554
Open-hearth steel rails.....	13,615	25,217	22,765	9,186
Total.....	1,461,837	1,844,100	1,686,794	1,360,694

The year 1881 was the year of largest production of rails of all kinds in the history of the country, aggregating 1,844,100 net tons, or 1,646,518 gross tons. In 1882, there was a decrease of 155,306 net tons, or about 8 per cent. In 1883, there was a decrease upon the production of 1882 of 328,100 net tons, or nearly 20 per cent. The decrease in 1883 upon the production of 1881 amounted to 483,406 net tons, or over 26 per cent.

No special significance attaches to the decreased production of open-hearth steel rails in the last two years, as open-hearth steel will never be a competitor with Bessemer steel in the manufacture of rails. The very great decline in the production of iron rails in recent years is, however, indicative of the almost total destruction of this branch of our iron industry. That only 64,954 net tons, or 57,995 gross tons, of iron rails should have been produced in 1883 is a result that was scarcely to have been looked for at so early a period after the rail scarcity of 1879 and 1880. The cheaper price at which Bessemer steel rails can be produced has, however, suddenly sealed the fate of iron rails.

Included in the production of Bessemer steel rails in 1883 were 32,629 net tons that were rolled in iron rolling-mills, chiefly from imported blooms. The remainder of the year's product (1,253,925 net tons) was rolled directly by the producers of Bessemer ingots. In 1882, there were rolled in iron rolling-mills 103,806 net tons of Bessemer steel rails, chiefly from imported blooms.

The production of street rails in 1883 (included in the total production of rails) was 19,440 net tons, a decrease of 2846 tons upon the production of 1882, which was 22,286 tons. The production in 1883 consisted of 1970 tons of rails, 14,499 tons of Bessemer steel rails, and 2971 tons of open-hearth steel rails.

The following table shows the production of rails of all kinds in 1883 by States in the order of their prominence :

STATES.	Net tons.	STATES.	Net tons.
Pennsylvania.....	857,818	Wyoming Territory.....	6,845
Illinois.....	232,005	Tennessee.....	2,650
New York.....	76,020	Wisconsin.....	1,259
Missouri.....	64,142	West Virginia.....	775
Ohio.....	62,518	Alabama.....	680
Colorado.....	19,688	New Jersey.....	60
Indiana.....	16,309	Total.....	1,360,694
Massachusetts.....	12,465		
California.....	7,460		

Pennsylvania's share of the total production of 1883 was 63 per cent ; Illinois made 17 per cent.

The following table will show approximately the consumption of all kinds of rails in this country from 1867 to 1883, in net tons :

YEARS.	Made in United States.	Imported.		Approximate consumption.
		Iron.	Steel.	
1867.....	462,108	163,049	.....	625,157
1868.....	509,714	250,081	.....	759,795
1869.....	593,586	313,163	.....	906,749
1870.....	620,000	399,153	.....	1,019,153
1871.....	775,733	506,202	.....	1,281,935
1872.....	1,000,000	381,064	149,786	1,530,850
1873.....	890,077	96,201	159,571	1,145,849
1874.....	729,413	7,798	100,515	837,724
1875.....	792,512	1,174	18,274	811,960
1876.....	879,829	287	None	879,916
1877.....	764,709	None	35	764,744
1878.....	882,685	None	10	882,695
1879.....	1,113,273	19,390	25,057	1,157,720
1880.....	1,461,837	132,450	158,230	1,752,526
1881.....	1,844,100	137,013	249,308	2,230,421
1882.....	1,686,794	41,992	182,135	1,912,921
1883.....	1,360,694	757	38,220	1,399,671

The figures given do not necessarily imply that all the rails made at home or imported from year to year have been actually laid down as promptly as they were provided, but they mean simply that the rails in the table have been manufactured and sold in the years specified, and hence have gone into consumption.

PRODUCTION OF BESSEMER STEEL IN 1883.

The production of Bessemer steel in the United States reached its highest point in 1882, when 1,696,450 net tons of ingots were produced. In 1883, the production amounted to 1,654,627 net tons, or 41,823 tons less than in 1882. This was the first decrease that has occurred in our Bessemer steel history. Fifteen Bessemer works were in operation in 1883—one (Union) for only a few weeks in the early part of the year. These fifteen works embraced in all 38 converters, but four of these converters were in use only a small part of the year. Two of these were connected with the Union works, and two were used by the Pennsylvania Steel Company in experimenting in the production of Bessemer steel by the basic process. The first blow of basic steel in this country took place at the works of this company on May 7th, 1883, and the results were in all respects satisfactory. The company is encouraged to begin the manufacture of this kind of steel as a commercial product at an early day. No other company in the United States has yet engaged in the manufacture of basic steel.

The works of the Scranton Steel Company, at Scranton, Pennsylvania, made an experimental blow on the 29th of March, 1883, and rolled its first steel rail on May 4th, 1883.

In addition to the fifteen completed Bessemer steel-works in the United States in 1883, there were in course of erection on the 1st of April last four new works—one in Massachusetts for the production of steel for the manufacture of light and heavy rails, and two in West Virginia and one in Ohio for the production of steel for the manufacture of steel-nail plates. Each of these new works will have two converters. A comprehensive exhibit of the nineteen Bessemer steel-works of the country which were completed in 1883 or were in course of erection on the 1st of April last is as follows :

NAMES OF COMPANIES.	CONVERTERS.	
	Completed.	Building.
Albany & Rensselaer Iron and Steel Company, Troy, N. Y. . . . .	two 8-ton	.....
Bethlehem Iron Company, Bethlehem, Pennsylvania.....	four 7-ton	.....
Pennsylvania Steel Company, Steelton, Pennsylvania.....	two 7-ton	.....
Lackawanna Iron and Coal Company, Scranton, Pennsylvania.....	three 8-ton	.....
Scranton Steel Company, Scranton, Pennsylvania.....	two 7-ton	.....
Cambria Iron Company, Johnstown, Pennsylvania.....	two 4-ton	.....
Carnegie Brothers & Co., Limited, Bessemer, Pennsylvania.....	two 7-ton	.....
Pittsburg Bessemer Steel Company, Limited, Homestead, Pa. . . . .	three 10-ton	.....
Pittsburg Steel Casting Company, Pittsburg, Pennsylvania.....	two 4-ton	.....
Cleveland Rolling-Mill Company, Cleveland, Ohio.....	one 6-ton	.....
North Chicago Rolling-Mill Company, Chicago (2 plants).....	two 7-ton	.....
Union Iron and Steel Company, Chicago, Illinois.....	three 10-ton	.....
Joliet Steel Company, Joliet, Illinois.....	two 6-ton	.....
St. Louis Ore and Steel Company, St. Louis, Missouri.....	two 5-ton	.....
Colorado Coal and Iron Company, South Pueblo, Colorado.....	two 7-ton	.....
Washburn Iron Company, Worcester, Massachusetts.....	two 5-ton	two 4-ton
Riverside Iron Works, Wheeling, West Virginia.....	.....	two 5-ton
Benwood Iron Works, Benwood, West Virginia.....	.....	two 4-ton
Bellaire Nail-Works, Bellaire, Ohio.....	.....	two 4-ton
Total number of converters.....	38	8

Of the four new Bessemer plants above mentioned as in course of erection on the 1st of April last, the works at Bellaire have since been completed, but, at the time this report goes to press, they have not been put in operation. A letter from the company, dated April 18th, says that they would be put in operation before May 1st.

In addition to the above, Messrs Oliver Brothers & Phillips, of Pittsburg, have just completed the erection of a small steel-making plant in that city, embracing one stationary converter, to be operated on the pneumatic principle.

The production of Bessemer steel ingots in this country in the twelve years from 1872 to 1883 has been as follows, in net tons :

Years.	Net tons.	Years.	Net tons.	Years.	Net tons.
1872.....	120,108	1876.....	525,996	1880.....	1,203,173
1873.....	170,652	1877.....	560,587	1881.....	1,539,157
1874.....	191,933	1878.....	732,226	1882.....	1,696,450
1875.....	375,517	1879.....	928,972	1883.....	1,654,627

The production of Bessemer steel ingots in this country from 1874 to 1883 by States has been as follows, in net tons :

YEARS.	Net tons of 2000 pounds.			
	Pennsylvania.	Illinois.	Other States.	Total.
1874.....	85,625	62,492	43,816	191,933
1875.....	148,374	136,356	90,787	375,517
1876.....	258,452	171,963	95,581	525,996
1877.....	328,599	111,290	170,689	560,587
1878.....	420,481	179,500	126,245	732,226
1879.....	514,165	250,980	163,827	928,972
1880.....	643,894	304,014	254,065	1,203,173
1881.....	844,501	37,763	318,893	1,539,157
1882.....	933,631	39,436	365,383	1,696,450
1883.....	1,044,396	273,325	336,906	1,654,627

As has been already remarked, there was a decrease in the production of Bessemer steel ingots in 1883 of only 41,823 net tons, as compared with the production of 1882, or from 1,696,450 tons to 1,654,627 tons. The quantity of these ingots which passes into forms other than rails is much larger than has been generally supposed. By reference to the statistics of iron and steel rails, already given, it will be seen that in 1883 we produced in the Bessemer works of the country, not counting the Bessemer steel rails produced in iron rolling-mills, 1,334,349 net tons of Bessemer steel rails, and that in 1883 we produced in like manner 1,253,925

tons. Very few of the rails rolled in iron rolling-mills in either year were from American blooms, and they need not be considered in this connection. In reducing ingots to finished forms, an allowance of about 12½ per cent must be made for loss in oxidation and for such crop-ends as must be reconverted.

PRODUCTS.	Net tons.		
	1882.	1883.	Decrease.
Bessemer steel ingots .....	1,696,450	1,654,627	41,823
Less about 12½ per cent oxidation and crop-ends to be reconverted.....	212,056	206,828	5,228
Bessemer steel in finished forms.....	1,484,394	1,447,799	36,595
Bessemer steel rails produced.....	1,334,349	1,253,925	80,424
Bessemer steel in other finished forms.....	150,045	193,874	Increase, 43,829

Assuming that practically the same quantity of ingots is carried over at the various Bessemer steel-works from year to year, it will be seen at a glance that a large proportion of our ingot tonnage goes into forms other than rails, and that this use of Bessemer steel increased in 1883 as compared with 1882. In 1882, over 10 per cent of the finished product appears to have been in miscellaneous forms, and in 1883 over 13 per cent appears to have been in these forms. These miscellaneous forms now conspicuously embrace steel for bridges and structural purposes generally, car and locomotive springs, angles and other shapes for ship-building, agricultural implements and machinery, plates and sheets, wire rods, and nails.

Nearly all our barbed wire is made of Bessemer steel wire rods, some of which are, however, imported. The production of barbed wire in this country, which is wholly used for fencing purposes, is said to have amounted in 1873 to only sixty tons, but in 1883 it amounted to about 100,000 tons. It is probable that the production in 1884 will not be much, if any, greater than in 1883.

CRUCIBLE, OPEN-HEARTH, BLISTER, AND MISCELLANEOUS STEEL IN 1883.

The production of crucible steel ingots in the United States reached its highest point in 1881, when 89,762 net tons were produced. There was a decrease from these figures in 1882, and a still further decrease in 1883. The production in 1883 was 80,455 net tons, a decrease of 4634 tons upon the production of 85,089 tons in 1882. The decrease in 1882 as compared with 1881 was 4673 tons. Six States made crucible steel in 1883, namely, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, and Ohio.

The following table gives the production of crucible steel ingots in various sections of the country from 1875 to 1883, in net tons :

STATES.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.
New England.....	1,620	1,098	1,974	1,602	1,608	690	2,780	1,000	2,373
New York.....	2,300	2,300	2,032	2,800	2,300	3,500	4,961	4,693	2,976
New Jersey.....	7,098	6,806	6,749	7,377	8,651	10,387	14,500	12,400	10,539
Pennsylvania.....	26,615	28,217	27,983	30,585	43,614	57,077	66,290	65,139	63,687
Western States.....	1,500	700	1,400	480	605	800	1,231	1,857	880
Southern States.....	298	261	292	62	2	.....	.....	.....	.....
Total.....	39,401	39,382	40,430	42,906	56,780	72,424	89,762	85,089	80,455

Included in the 80,455 tons of crucible steel ingots produced in 1883, are 1000 tons of castings made directly from the crucibles.

The production of open-hearth steel ingots in the United States in 1883 was 133,679 net tons, a decrease of 26,863 tons upon the production of 160,542 tons in 1882, which is the highest that has yet been attained. This is the first decrease in production that has occurred in the open-hearth steel industry of this country. The product of 1883 was made in eight States, namely, New Hampshire, Massachusetts, New York, New Jersey, Pennsylvania, Ohio, Tennessee, and Illinois.

Included in the production of open-hearth steel ingots in 1883 are 1684 net tons of steel castings made directly from the open-hearth furnace. The production of steel castings is rapidly increasing in this country.

The following table gives the production of blister, puddled, and patented steel in the United States from 1875 to 1883 in net tons. The product of 1883 was made in four States, namely, New York, Massachusetts, Pennsylvania, and Ohio :

STATES.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.
New England.....	1,500	.....	.....	192	950	72	200	.....	713
New York.....	.....	139	.....	220	215	617	.....	.....	1,105
New Jersey.....	100	632	.....	.....	.....	.....	.....	.....	.....
Pennsylvania.....	7,340	7,601	9,870	8,069	3,004	6,658	2,113	2,114	2,558
Western States.....	.....	1,700	2,034	75	1,000	1,018	734	900	1,222
Southern States.....	3,667	214	20	.....	295	100	.....	.....	.....
Total.....	12,607	10,306	11,924	8,556	5,464	8,465	3,047	3,014	5,598

PRODUCTION OF ALL KINDS OF STEEL FROM 1872 TO 1883.

The following table gives the production in the United States of all kinds of steel in the twelve years from 1872 to 1883, in net tons. This is another table that may well excite the pride of our people :

YEARS.	Net tons of 2000 pounds.				
	Bessemer steel ingots.	Crucible steel ingots.	Open-hearth steel ingots.	All other steel.	Total.
1872.....	120,108	29,260	3,000	7,740	160,108
1873.....	170,652	34,786	3,500	13,714	222,652
1874.....	191,933	36,326	7,000	6,353	241,614
1875.....	375,517	39,401	9,650	12,607	436,575
1876.....	525,996	39,382	21,480	10,306	597,174
1877.....	560,587	40,430	25,031	11,924	637,972
1878.....	732,226	42,906	36,126	8,556	819,814
1879.....	928,972	56,780	58,290	5,464	1,047,506
1880.....	1,203,173	72,424	112,953	8,465	1,397,015
1881.....	1,539,157	89,762	146,946	3,047	1,778,912
1882.....	1,696,450	85,089	160,542	3,014	1,945,095
1883.....	1,654,627	80,455	133,679	5,598	1,874,359

PRODUCTION OF BARS, SHAPES, PLATES, SHEETS, AND OTHER ROLLED IRON IN 1883.

By the term rolled iron we include (1) cut nails and spikes; (2) bar, shaped, bolt, rod, skelp, and hoop iron, and rolled axles; (3) plate and sheet-iron; and (4) all sizes of iron rails.

Omitting iron rails, our production of rolled iron in 1882 was 2,265,957 net tons, against 2,155,346 tons in 1881, an increase of 110,611 tons. In 1883, still omitting iron rails, our production of rolled iron was 2,283,920 tons, an increase of 17,963 tons over the production of 1882. This increase was more than covered by the extraordinary increase in the production of nail plate for cut nails and spikes. In 1882, the production of nail plate was 307,355 net tons, and in 1883 it was 388,136 tons, an increase of 80,781 tons.

In the following table, we give detailed statistics of the production of the different forms of rolled iron in 1883, in net tons :

STATES.	Bar, rod, bolt, hoop, skelp, and shaped iron. Net tons.	Plate and sheet iron, except nail plate. Net tons.	Cut nails.		Iron rails. Net tons.	Total. Net tons.
			Kegs.	Net tons.		
Maine.....	8,947	1,350	7,306	365	.....	10,662
New Hampshire.....	2,132	26	.....	.....	.....	2,158
Massachusetts.....	47,915	18,626	677,540	33,877	.....	100,418
Rhode Island.....	14,405	.....	.....	.....	.....	14,405
Connecticut.....	18,491	50	.....	.....	.....	18,541
New York.....	104,229	677	14,768	738	.....	105,644
New Jersey.....	56,839	2,305	338,107	16,905	60	76,109
Pennsylvania.....	675,226	254,446	2,430,552	121,528	29,963	1,061,163
Delaware.....	22,755	12,629	.....	.....	.....	35,384
Maryland.....	17,459	11,491	.....	.....	.....	28,950
District of Columbia.....	141	8	.....	.....	.....	149
Virginia.....	22,687	.....	161,279	8,064	.....	30,751
Alabama.....	6,656	.....	20,000	1,000	680	8,336
West Virginia.....	4,964	7,781	1,327,484	66,374	775	79,894
Kentucky.....	36,531	14,498	144,686	7,234	.....	58,263
Tennessee.....	9,876	.....	212,358	10,618	2,050	22,454
Ohio.....	263,247	49,987	1,249,700	62,485	2,243	377,962
Indiana.....	18,921	.....	413,380	20,669	16,297	55,887
Illinois.....	94,747	.....	526,108	26,305	630	121,702
Missouri.....	9,642	6,168	.....	.....	23	15,833
Michigan.....	8,080	3,820	.....	.....	.....	11,900
Wisconsin.....	38,946	.....	.....	.....	1,249	40,195
Nebraska.....	.....	.....	65,000	3,250	.....	3,250
Colorado.....	3,496	.....	62,969	3,149	1,209	7,844
Wyoming Territory.....	4,443	.....	.....	.....	6,845	11,288
California.....	20,747	500	111,500	5,575	2,910	29,732
Total.....	1,511,422	384,362	7,762,737	388,136	64,954	2,348,874

The most prominent nail manufacturing district in the United States is the Wheeling District, which includes the nail factories in West Virginia and in that part of Ohio which lies near Wheeling. The following table shows the production of this district in the last four years, as compared with the production of the United States :

DISTRICT.	Kegs of 100 pounds.			
	1880.	1881.	1882.	1883.
West Virginia.....	1,025,155	1,241,102	1,023,711	1,327,494
Part of Ohio.....	445,248	461,020	474,435	874,926
Total Wheeling District.....	1,470,403	1,702,122	1,498,146	2,202,410
Total United States.....	5,370,512	5,794,206	6,147,097	7,762,737

PRODUCTS OF FORGES AND BLOOMARIES IN 1883.

As we have heretofore explained, blooms and billets from ore are made chiefly in the Champlain District of New York, and blooms from pig and scrap-iron are made chiefly in Pennsylvania. The former are used for conversion into plate and sheet-iron, iron wire, and open-hearth and crucible steel; the latter almost wholly for conversion into plates and sheets. The make of each of these products in the last ten years is given below, in net tons :

PRODUCTS.	Net tons of 2000 pounds.									
	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.
Blooms and billets from ore.....	36,450	24,416	20,784	24,227	24,139	30,282	40,652	45,369	48,354	35,237
Blooms from pig and scrap-iron.....	25,220	24,827	23,844	23,073	25,906	32,071	33,937	39,237	42,939	39,521
Total.....	61,670	49,243	44,628	47,300	50,045	62,353	74,589	84,606	91,293	74,758

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CONTRACTS FOR THE PHILADELPHIA GAS TRUST.—A special meeting of the Philadelphia Gas Trust was held May 2d, to hear the report of the Committee on Works concerning the coal contracts for the ensuing year. It was recommended that they be awarded as follows: Despard Company, 20,000 tons at \$3.97; James Boyce, Gaston coal, 20,000 tons at \$3.94; Chesapeake & Ohio Railroad agency, 20,000 tons at \$4.15; Penn Gas-Coal Company, 140,000 tons at \$4; Westmoreland Coal Company, 140,000 tons at \$4; Newbury Coal Company, 5000 tons at \$3.90; West Fairmount Coal Company, 5000 tons at \$3.89. The committee also advised that 70,000 tons be purchased from the Penn and Westmoreland companies, provided they will deliver it according to the Chief-Engineer's schedule. The report was adopted.



THE ASHCROFT FURNACE-DOOR AND GRATE-BARS.

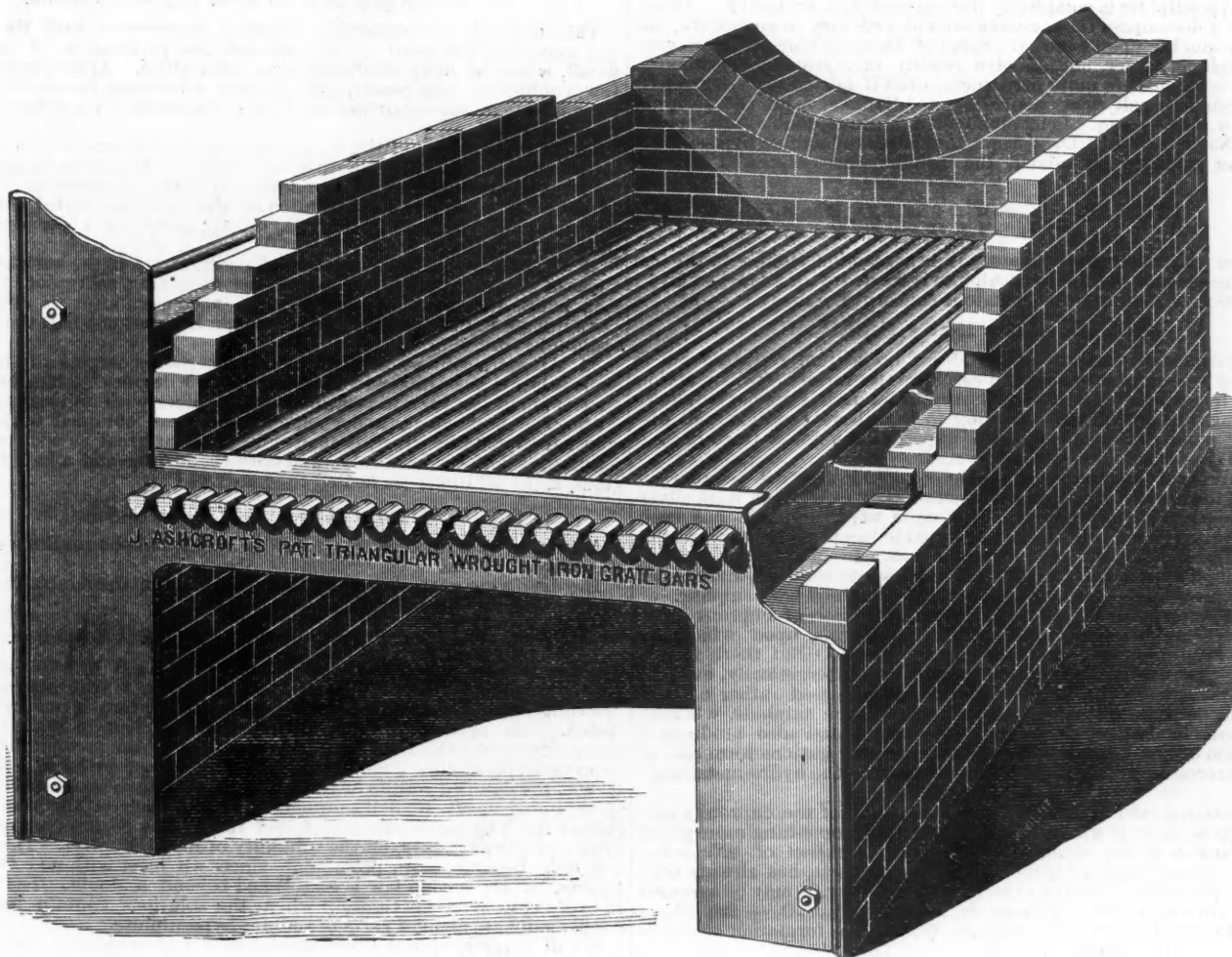
The Ashcroft furnace-door is hinged upon the boiler or furnace front in the usual manner; but a rectangular central part of the door, corresponding in size to the fire-door opening, is cast separately, and hung upon horizontal pivots, and is so balanced as to remain in any desired position. This central part of the door is made double—that is, with an inner and outer wall—forming a channel into which the air enters through a slit at the top, and, passing downward between the inner and outer walls, becomes heated by the action of the fire, and enters the furnace in immediate contact with the fuel and the gases arising from it.

By this construction, any imperfectly burnt gases evolved are made to combine with the oxygen of the entering air, effecting a more perfect combustion. In the manipulation of the fire—as by the introduction of a poker to break up the congealed mass that results from the burning of soft coal—the furnace-door does not require to be opened; neither does the pivoted door to a greater extent than is sufficient to introduce the poker under it. In this way, the entrance of an excess of air is prevented, and the heat of the furnace maintained during such operations, which is of the greatest consequence as regards both the efficiency and the durability of the boiler. When throwing in fuel, the door must of course be open; but the time need only be of short duration, and, for the admission of air in proper quantity, is readily adjusted to the requirements of

triangular bar can be run with many kinds of coal, for almost any length of time, without "cleaning," as, by manipulation of these bars, the fires are perfectly cleaned, without resort to other means. A single bar may be at any time withdrawn from the furnace for examination, and reinserted, without affecting the fire, and without opening the furnace-door. No part of the grate can escape attention, with any length of furnace, as every movement given to a bar is, of course, transmitted through its whole length, reaching the otherwise almost inaccessible corners of the furnace, both front and back. The air spaces of the entire grate are thus made available for the introduction of air.

In burning large coal, or coal which cokes or congeals, it is advisable to admit through the grate as large an amount of air as possible. This is effected by turning each alternate bar upside down. By this means, the air spaces will be nearly doubled. It is claimed that these steel and wrought-iron bars outwear three sets of any cast-iron bars ever made, and when worn out can be renewed for one half the cost of cast-iron bars.

These patent furnace-doors and revolving grate-bars are applicable to the furnaces of all kinds of steam-boilers. They have been adopted exclusively by many of our largest manufacturers. The saving of fuel in some cases is stated to exceed twelve per cent, while in many cases the bars have been in constant use for five and even for six years without necessity of renewal.



THE ASHCROFT FURNACE-DOOR AND GRATE-BARS.

any kind of fuel. By swinging the top of the pivoted door a little outward, the fire may be examined over it with the utmost advantage, without permitting the air to enter injuriously, or subjecting the operator to the fierce heat and glare of the furnace. This furnace-door remains quite cool when in use; in fact, it may be leisurely opened and closed by hand without the least inconvenience, and the boiler-room temperature is correspondingly low. In its application to boilers now in use, no alteration of boiler front is necessary.

The Ashcroft revolving grate-bars, represented by Fig. 1 are of rolled wrought-iron or steel, are triangular in form, are made of different diameters, and of any length required. They lie loosely on grooved cross-bearers, placed at suitable distances apart, which not only support the grate-bars, but retain each in its proper relative position. These bearers are fitted into the walls of the furnace, as shown in the engraving. The ends of the grate-bars project through to the outside of the furnace-front, so that, by means of a key-wrench, each bar can be shaken or revolved independently. This operation, it is claimed, effectually removes all the ashes from the bars, without disturbing the fire or opening the furnace-door, prevents the formation of clinkers, and insures a constant and full supply of air through the grate, with improved draught and practically perfect combustion. These grate-bars are quite free to expand and contract longitudinally, and do not easily bend or warp. No slice or poker is used, except with coking coal, and consequently a great loss of heat and steam, from frequently opening the furnace-door, is avoided. Furnaces fitted with this revolving

COLORADO DIRECTORY.—Through the courtesy of James R. Ives & Co., of Denver, we are in receipt of a copy of the new Colorado State Business Directory, for 1884. The present is the tenth annual volume of this valuable work, and, like its predecessors, does credit to the energy and enterprise of its publishers. In addition to the usual features of a work of this kind, the book before us contains long lists of the leading mining men of the State who are not engaged in other business; also lists of the mining companies and producing mines, cattle men, and wool growers.

SILICON IN PIG-IRON.—G. Sabudsky has brought before the Russian Chemical Society the results of some researches made with the object of ascertaining what part silicon plays in pig-iron. He analyzed two specimens of pig exhibited by the Demidow Works, at Moscow, in 1882, with the following results:

	No. 1.	No. 2.
Combined carbon.....	0.00	0.580
Graphitic carbon.....	1.94	2.380
Silicon.....	9.50	5.920
Sulphur.....	0.02	0.027
Phosphorus.....	0.11	0.140
Manganese.....	12.00	10.900

In decomposing these specimens of pig-iron with a mixture of sulphate of copper and salt, only a part of the silicon was dissolved, and the striking fact was noted that while, in the case of No. 1, only about from one ninth to one fifteenth of the silicon in the pig was dissolved, seven eighths were dissolved in the case of No. 2. M. Sabudsky claims that the silicon undissolved is contained in the residue as  $H_2Si_2O_7$  and  $H_2Si_4O_9$ .

## RUSSELL'S IMPROVED PROCESS FOR THE LIXIVIATION OF SILVER ORES.—II.\*

With Critical Remarks on other Methods of Copper, Silver, and Gold Extraction.

By C. A. Stetefeldt, New York City.†

If lead is to be precipitated by this process, the use of calcium hyposulphite is not admissible, nor can a calcium sulphide be used for the precipitation of the silver, as will be fully discussed below.

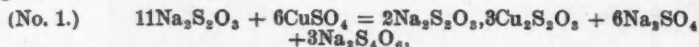
The last-mentioned experiment led Mr. Russell to investigate the properties of a hyposulphite solution to which copper sulphate has been added. He calls this the "Extra-Solution," to distinguish it from the ordinary hyposulphite solution, without copper. The discovery of the reactions of this extra-solution constitutes, in its practical application, Mr. Russell's second and most important improvement of the lixiviation of silver ores.

## II. THE EXTRA-SOLUTION.

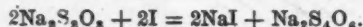
If solutions of alkaline hyposulphites are mixed with salts of cupric oxide, hyposulphite double salts, containing the alkali and cuprous oxide, are formed. If the solutions are not too dilute, these double salts separate in the form of canary-yellow precipitates.

The latter, under certain conditions, turn black in consequence of the formation of copper sulphide. By treating them with boiling water, the cuprous hyposulphite is completely decomposed into a sulphide. Dilute acids do not decompose these double salts at ordinary temperature, but do so very quickly upon heating. Some of these double salts are very little soluble in water, but dissolve readily in aqueous hyposulphite. The latter solutions are quite permanent, even if heated to 85 degrees C.

The potassium salt has, according to Rammelsberg, the formula  $K_2S_2O_3, Cu_2S_2O_3 + 2aq$ . Lenz obtained a sodium double salt of the formula  $2Na_2S_2O_3, 3Cu_2S_2O_3 + 5aq$ . If solutions of sodium hyposulphite and copper sulphate are mixed, the reactions are expressed by the equation:



leaving out the water equivalents. It is a reaction similar to the one which takes place if sodium hyposulphite is treated with iodine, as far as the formation of sodium tetrathionate is concerned, namely:

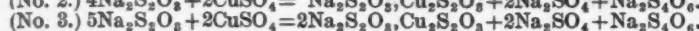
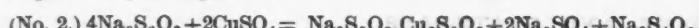


Some writers state that in equation No. 1 no sodium tetrathionate is formed, but free sulphuric acid and sulphur, the former again reacting upon the hyposulphites and precipitating sulphur and copper sulphide. In preparing the precipitate according to the above equation, and dissolving it again in aqueous sodium hyposulphite, not a trace of free sulphur or copper sulphide was discovered.

The solutions of the cuprous hyposulphite double salts are peculiar on account of the energetic decomposing action they exert upon most silver combinations and silver minerals. That upon silver sulphide has been especially investigated. If the silver sulphide has been freshly precipitated, the reaction is practically instantaneous. In all cases, an argentic hyposulphite double salt is formed, which goes into solution, and copper sulphide is precipitated in case the silver was combined with sulphur.

We have here an interesting parallel with the action of cuprous chloride on silver sulphide, and various silver minerals, upon which the process of raw amalgamation is principally based. But there is this difference, that cuprous hyposulphite acts very energetically, even in dilute solutions, while the cuprous chloride must be used rather concentrated to decompose most silver minerals, except the sulphide, whereby it becomes too expensive for practical operations, and also produces a silver bullion of low fineness. The following investigations form one of the most interesting and important contributions to the hydro-metallurgy of silver.

Before entering into a discussion of the reactions of the cuprous hyposulphite double salts, it will be important to know something more about the peculiarities of the sodium salts. The formation of  $2Na_2S_2O_3, 3Cu_2S_2O_3 + 5aq$ , which we will call the two-third salt, has already been indicated. From Mr. Russell's experiments, however, it may be assumed that there are two other salts, namely,  $Na_2S_2O_3, Cu_2S_2O_3 + 2aq$  (the  $\frac{1}{3}$  salt), and  $2Na_2S_2O_3, Cu_2S_2O_3 + 3aq$  (the  $\frac{2}{3}$  salt), the formation of which is expressed by the equations:



Lenz has also found a double salt of the formula  $3Na_2S_2O_3, Cu_2S_2O_3 + aq$ .

If we consider that the atomic weight of  $CuSO_4 + 5aq = 279$ , and that of  $Na_2S_2O_3 + 5aq = 278$ , it will be seen that, for satisfying the conditions of equation No. 2, two parts of sodium hyposulphite to one part of copper sulphate are required, and that the conditions of the first equation are produced by a slight excess of copper sulphate, and those of the equation No. 3 by a somewhat greater excess of sodium hyposulphite than the second equation calls for. From this it follows that, by mixing the reagents about in the proportion of two to one, all these double salts may be formed, but that an increased amount of copper sulphate will principally, or only, produce the  $\frac{1}{3}$  salt.

If concentrated solutions of the reagents are mixed, the cuprous hyposulphite double salts soon begin to precipitate as a crystalline powder, and continue to do so, until finally the solution contains very little cuprous hyposulphite. The more concentrated the solutions are, the more rapid and complete is the separation. This shows that these double salts are almost insoluble in concentrated solutions of sodium sulphate [and tetrathionate]. If the clear solution is decanted from the precipitate, the latter can be more or less redissolved by water, especially if warm. A diluted sodium hyposulphite solution, however, is a much better solvent than pure water. In case the reagents have been

mixed in the proportions expressed by equation No. 1, namely, 9 parts sodium hyposulphite to 5 parts copper sulphate, the clear liquid above the precipitate is almost free from copper and sodium hyposulphite. The yellow precipitate contains 33.7 per cent copper, which corresponds exactly with the formula of the  $\frac{1}{3}$  salt of Lenz. This salt is almost insoluble in water. Its solubility in sodium hyposulphite solutions is materially affected by the concentration of the latter. Concentrated solutions are much poorer solvents than diluted ones, those of 1 to 2 per cent concentration acting most energetically. These solutions, most likely, contain the double salt of Lenz, having the formula  $3Na_2S_2O_3, Cu_2S_2O_3 + aq$ . Mr. Russell found that the  $\frac{1}{3}$  salt can be kept moist, or dried at a temperature of about 40 degrees C. without decomposing. In attempting to get it dry at a much higher temperature, rapid decomposition took place. The solution of the  $\frac{1}{3}$  salt in aqueous hyposulphite of about 2 per cent concentration is quite permanent, and can be heated to 70 degrees or 85 degrees C. without decomposing. At higher temperature, it turns dark, and copper sulphide commences to separate. As soon as decomposition has been started, it increases rapidly, on account of the formation of free sulphuric acid.

Extra-solutions prepared from calcium hyposulphite are about equal in effect to those in which the sodium salt has been used. The potassium cuprous hyposulphite, however, acts with much less energy.

## III. THE REACTIONS OF THE EXTRA-SOLUTION.

## § 12. Solubility of Metallic Silver in Extra-Solution.

This subject is of considerable practical importance, and Mr. Russell has furnished me with ample material, the publication of which, in detail, would be more confusing than interesting. After eliminating a few conflicting statements, and making allowance for slight errors, unavoidable in such experiments, I have formulated the following laws from the results:

1st. If the same quantities of sodium hyposulphite and copper sulphate are dissolved in varying quantities of water, the dissolving energy of the solution is not materially increased with its concentration. In the experiments made, the concentration of the solutions varied between 2 per cent and 20 per cent in  $Na_2S_2O_3 + 5aq$ ; and from 1 per cent to 10 per cent in  $CuSO_4 + 5aq$ .

2d. If, to a hyposulphite solution of constant strength, variable quantities of copper sulphate are added, the dissolving energy of the solution is not increased by concentration in copper, after so much copper sulphate has been added that its weight is about one half that of the sodium hyposulphite.

3d. An extra-solution at 50 degrees C. acts more energetically than the same solution at ordinary temperature, say 15 degrees C., but the difference is much less than in treating metallic silver with ordinary solution.

4th. The best effect, under equal conditions, obtained with extra-solution on metallic silver, is about nine times as great as with ordinary solution, if both are used cold; and only about three and a half times as great, if the solutions are heated to 50 degrees C.

## § 13. Solubility of Metallic Gold in Extra-Solution.

A series of experiments was made as in § 2, but the results were substantially the same.

The dissolving energy of an hyposulphite solution upon metallic gold is not increased by the addition of a copper salt.

## § 14. Solubility of a Silver Sulphide in Extra-Solution.

I have already stated that in decomposing  $Ag_2S$  by extra-solution, copper sulphide is formed. Mr. Russell failed to get accurate results in determining the amount of copper so precipitated, for reasons previously stated. The copper found was always more or less in excess of the theoretical quantity called for. This is caused by the precipitation of a cuprous hyposulphite double salt from more concentrated solutions. Hence, the detailed results of these experiments have no special interest. In summing up Mr. Russell's numerous experiments on the decomposition of  $Ag_2S$  by extra-solution, I find the results correspond with the laws established in § 12, on the solubility of metallic silver. These laws not only become more prominent, since we meet with no conflicting figures, but the second law is established beyond a doubt. The effect, in every case, is a maximum, when the solutions contain for 1 part copper sulphate about 2 parts of sodium hyposulphite.

It will be interesting to illustrate this by a few examples. In all the following experiments, 2 gm. sulphides with 0.860 gm. silver were treated, which had been obtained in the lixiviation process, and were, principally, a mixture of  $Ag_2S$  and  $CuS$ .

The extra-solution measured in each case 1000 c.c., and all samples were treated under exactly the same conditions:

Extra-solution with:	$Na_2S_2O_3 + 5aq$ gm.	$CuSO_4 + 5aq$ gm.	Silver dissolved: gm.	per cent of 0.860 gm.
	250	50	0.333	62
	200	50	0.662	77
	150	50	0.731	85
Maximum effect.	100	50	0.791	92
	50	50	0.705	83
	25	50	0.602	70
	10	50	0.455	53
	250	10	0.206	24
	200	10	0.206	24
	150	10	0.198	23
	100	10	0.318	37
	50	10	0.490	58
Maximum effect.	25	10	0.662	77
	10	10	0.473	55

In comparing the effect of standard extra-solutions (I give this name to the solution which has for 1 part copper sulphate about 2 parts sodium hyposulphite) of different concentration, we find that the more dilute solutions act with much more energy than concentrated ones, considering the quantity of reagents they contain.

Averaging a number of experiments, 1000 c.c. of a standard extra-solution, with 1 per cent  $CuSO_4 + 5aq$ , dissolved 0.645 gm. silver, while a solution with 5 per cent  $CuSO_4 + 5aq$ , dissolved 0.808 gm. silver only, although the latter contained five times the amount of reagents. Their relation is considerably modified when a large surplus of  $Ag_2S$  is used,

\* Read at the Cincinnati Meeting of the American Institute of Mining Engineers.  
† In our first installment of this paper, May 3d, page 326, second column, sixth line from the top, the words "nitric acid" should be "nitric oxide."



as will be seen from another series of experiments in which 20 gm. pure silver sulphide were treated with 1000 c.c. of extra-solution :

Extra-solution with:	Na <sub>2</sub> S <sub>2</sub> O <sub>2</sub> +5aq.		CuSO <sub>4</sub> +5aq.		Silver dissolved:	
	gm.	gm.	gm.	gm.	per cent of 4.710 gm.	
Maximum effect.	250	50	1.900	40		
	200	50	1.911	40½		
	150	50	3.870	82		
	100	50	4.710	100		
	50	50	3.225	68		
	25	50	1.845	39		
	10	50	0.663	14		
	250	10	0.314	6½		
	200	10	0.312	6½		
	150	10	0.384	8		
Maximum effect.	100	10	0.670	14		
	50	10	1.514	32		
	25	10	1.880	40		
	10	10	0.583	12		

The rationale of all the results recorded in this paragraph, and in § 12, becomes evident when we consider what has been stated in regard to the properties of the sodium cuprous hyposulphite double salts. If extra-solutions are prepared, as was done in these experiments, a large portion of the cuprous hyposulphite must at once separate in minute crystals, even if their formation is not immediately perceptible. It is only the

converted into Au<sub>2</sub>S<sub>3</sub>, and treated with extra-solutions of varying concentration, and at different temperatures. The solution acts best at a moderate temperature, and heating it seems to be of no benefit. The maximum effect of the standard extra-solution was not clearly established, but an injurious effect was observed by an increase of copper sulphate.

§ 16. Solubility of Silver Arsenate and Antimonate in Extra-Solution.

Extra-solution produces no effect on Ag<sub>3</sub>AsO<sub>4</sub>, differing in any way from that recorded in § 5. The same is to be said about silver antimonate.

How extra-solution acts on silver minerals will be found in a subsequent paragraph. (TO BE CONTINUED.)

THE BLASS SUCTION CONDENSER AND REGULATOR.

With the object of increasing the duty of direct-acting steam-pumps, which have become such a favorite means of draining mines, Mr. Blass, after a series of experiments at the mines in charge of which he is, has designed the condenser and regulator shown in our drawings, which are in course of introduction by Messrs. Frink & Angevine, No. 12 Cortlandt

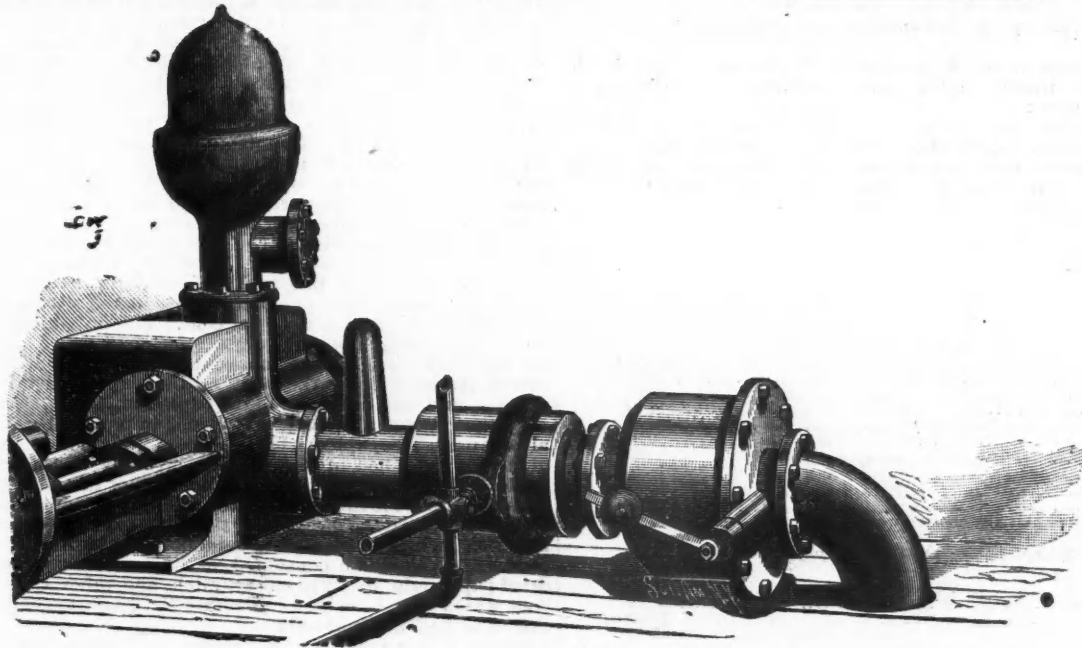


Fig. 1.

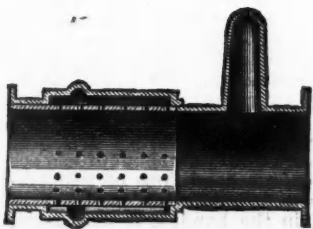


Fig. 2.

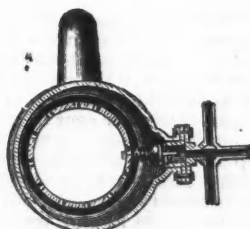


Fig. 3.

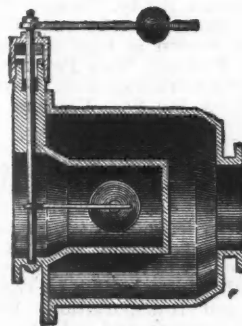


Fig. 4.

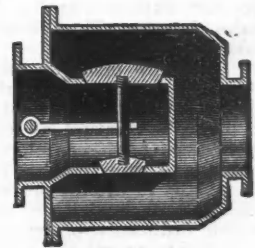


Fig. 5.

THE BLASS SUCTION CONDENSER AND INJECTION REGULATOR.

solution which reacts, and not the precipitate. The more concentrated the solutions are, the more rapidly will the formation of the precipitate take place. Hence the comparatively better effect of dilute solutions. An excess of copper sulphate above the standard proportions favors the formation and precipitation of the least soluble  $\frac{1}{2}$  salt, and the solution becomes at once weak. On the other hand, if there is a considerable excess of sodium hyposulphite, the solubility of the most soluble double salt is materially decreased, and also in this case the solution will hold less of the reagent. For these and other reasons, it is more profitable to prepare the extra-solution by forming the precipitate first, and then dissolving it in a dilute sodium hyposulphite solution.

§ 15. Solubility of Gold Sulphide in Extra-Solution.

Au<sub>2</sub>S<sub>3</sub> is readily decomposed by extra-solution. In investigating this subject, Mr. Russell obtained rather irregular figures. It seems that the temperature at which the Au<sub>2</sub>S<sub>3</sub> is precipitated by H<sub>2</sub>S, and various other conditions, influence the result. In the following experiments, 0.500 gm. gold were dissolved in aqua regia, and precipitated with H<sub>2</sub>S. The Au<sub>2</sub>S<sub>3</sub> was treated with 1000 c.c. of a standard extra-solution containing  $\frac{1}{2}$  per cent CuSO<sub>4</sub> + 5aq. After one hour, 0.460 gm. gold had gone into solution; after an hour and a half, another sample showed nearly all the gold, namely, 0.482 gm., dissolved. In this case, too, copper sulphide is precipitated.

In another series of experiments, 1.333 gm. gold were, in each case,

street, this city. He utilizes the water entering the pump through the suction-pipe to condense the exhaust-steam from the steam-cylinder of the pump, thus creating a partial vacuum and attaining the economy of steam, and consequently of fuel, which condensing engines offer over non-condensing ones. The condenser, of which Fig. 2 is a longitudinal section and Fig. 3 a transverse one, forms part of the suction-pipe, and is in length about three times its diameter. At the exhaust-neck, there is a slight enlargement; inside this enlargement, is a perforated tube, on the same plane with the inside of the suction-pipe; this forms a chamber between the tube and the shell of the condenser for the steam of the exhaust to come in contact with the water through the perforations of the tube, so as to make an even distribution of the steam through the water, and an instantaneous condensation. The chamber is made small, so as to hold but little water between the exhausts, and have but little to force out at each exhaust. This chamber is provided with an eccentric-shaped steam-channel to conduct the steam around the chamber. The holes in the tube are small on the side next the exhaust-neck, and gradually increase in size to a point diametrically opposite. The exhaust-neck is provided with a bushen that forms a valve-seat for the poppet-valve. The condenser is provided with a vacuum-chamber to cushion the water at the end of each stroke, which prevents pounding in the suction-pipe. It does away with the steam and also the noise of the exhaust, the only sound heard being the click of the poppet-valve in the exhaust-port of the condenser. The use of this valve

was found necessary to prevent the water from the suction-pipe rushing through the exhaust-pipe to the steam-cylinder of the pump when the vacuum of the cylinder exceeds that of the condenser.

When the suction-pipe is from 15 to 25 feet in length, the condenser is all that is required; but when less than 15 feet, it is necessary to use the injection regulator in connection with the condenser, its object being to regulate the flow of water in a short suction-pipe and to maintain a high vacuum in the condenser. The injection regulator, of which Fig. 4 is a horizontal and Fig. 5 a vertical section, is made in two parts; one is made with a flange to connect it with the suction-pipe, and terminates in the casing which forms the other part. Inside the casing, are two differential valve-seats, into which works a double-beat differential valve; from this valve an arm extends back to the shaft, which passes out through an air-tight packing-box; on this shaft, a lever is fastened, and upon this a weight is placed. It will be seen from the cut that the power the water has to open this valve depends upon the difference in the size of the valves, and that is balanced by the weight. When the regulator is placed on a suction-pipe, no matter how short, by adjusting the weight on the lever, any desired vacuum can be maintained. It gives the pump a full and regular supply of water, and at the same time holds it under the desired vacuum.

#### DYNAMITES WITH GUNPOWDER AS ABSORBENT.

In his valuable Notes on the Literature of Explosives, printed in the Proceedings of the United States Naval Institute, Prof. Charles E. Munroe, U.S.N.A., says:

Recently, some of the papers in the suits of the Atlantic Giant Powder Company against George A. Goodyear, George W. Townsend, Michael Brady, and the Neptune Powder Company have come into our hands. The compositions of the various explosives that the Atlantic Giant Powder Company regarded as infringements of their patents, were as follows:

Vulcan Powder.		Per cent.
Nitro-glycerine.....		32.60
Nitrate of soda.....		49.46
Charcoal.....		9.63
Sulphur.....		8.31
Neptune Powder.		Per cent.
Nitro-glycerine.....		32.66
Nitrate of soda.....		45.04
Charcoal.....		17.44
Sulphur.....		4.86
Ash.....		0.94
Miners' Powder Company's Dynamite.		Per cent.
Nitro-glycerine.....		32.91
Nitrate of soda.....		49.88
Charcoal, wood, and partially charred wood.....		17.21
Ash.....		1.18
Brady's Dynamite or Vulcan Powder.		Per cent.
Nitro-glycerine.....		33.00
Nitrate of soda.....		50.00
Charcoal.....		10.00
Sulphur.....		7.00

It will be observed that all these powders are practical dynamites in which gunpowder is used in place of infusorial earth as the absorbent. In regard to the powder made by Michael Brady, Thomas Varney, a manufacturer of nitro-glycerine, dynamite, etc., testifies that it "belongs to a class which is now quite large and known as high explosive powder. Some of their names are Giant Powder, Mica Powder, Vulcan Powder, Jupiter Powder, Neptune Powder, Thunderbolt Powder, Hercules Powder, Titan Powder, Rend-Rock Powder, Vigorite Powder, Lithofracteur Dualin.

"They are made by mixing nitro-glycerine with a dry pulverized substance or mixture of substances such as have the capacity of taking up and holding a sufficient proportion of nitro-glycerine by absorption to make the mixture an effective explosive, and yet without being in such excess as to separate from the mass by leakage or compression, and at the same time the absorbent solids employed being such as will not chemically injure the proper explosive quality of the nitro-glycerine, and such as will render the mass practically inexplodable by concussions which ordinarily occur in handling and transportation. The solid ingredients, to wit, the nitrate of soda, charcoal, and sulphur, are first ground or otherwise pulverized, and dried if necessary. The nitro-glycerine is then carefully mixed with them, so as to make a mass as nearly homogeneous as practicable, and the powder is then packed for market.

"In the manufacture of Vulcan powder, there is a combination of nitro-glycerine with absorbent substances which are the equivalents of infusorial earth; and this combination constitutes an explosive compound which has all the properties and qualities of the compound made by combining nitro-glycerine with infusorial earth in making dynamite or Giant powder, or with mica scales in making Mica powder, or with mealed gunpowder in making Vulcan powder.

"In the first place, each of the materials used as absorbents in the Vulcan powder is solid. In the next place, they are all free from any quality which will decompose, destroy, or injure the nitro-glycerine. They are capable of pulverization. They are also dry, or may be made so. When pulverized, each of them alone, or all of them in the proportions actually used, or in any other proportions, they will absorb and hold nitro-glycerine to the extent required by the patent sued upon, to wit, enough to make an explosive powder without rendering the powder leaky, and without any explosive aid from the absorbents themselves.

"Dry pulverized nitrate of soda will thus hold 30 per cent of nitro-glycerine, charcoal 45 per cent, sulphur 30 per cent (all these are explosive compounds), and when combined, as in Vulcan powder, they will thus hold 33 per cent."

After asserting that the absorbent of the Vulcan powder is similar to the infusorial earth in converting the liquid nitro-glycerine into the solid form, he adds: "The Vulcan powder absorbent, like that of the Neptune and Vigorite absorbents, has one quality not possessed by infusorial earth, to wit, combustibility; but this quality does not affect the powder

as dynamite. Its only effect is to allow the absorbent to be burned by the heat of the exploding nitro-glycerine, thus adding gas and force to the explosion. Vulcan powder is no more combustible than dynamite of infusorial earth; in fact, not as much so; that is, if an equal quantity of the two be set on fire, the Vulcan powder will burn the longest. Vulcan powder is practically as safe against concussion as infusorial earth dynamite.

"This particular class of powders, with combustible absorbents, has been made and sold by the complainant since the commencement of its business, which was in October, 1871. It had previously been made and sold by Alfred Nobel & Co. and by the Giant Powder Company, and by no other person or party prior to its use by them, to the best of my knowledge and belief. It has always been made and sold by the two Giant Powder companies, under the name Giant Powder No. 2, and labeled as patented under the original dynamite patent of May 26th, 1868, and its reissues. Nobel & Co. have always made and sold it as Dynamite No. 2. The two Giant Powder companies have made and sold more of No. 2 than of No. 1—meaning by No. 1 infusorial earth dynamite or Giant powder. The nitrates of our No. 2 have always been those of potash or soda. It has been the same with Vulcan powder. Our carbons have been rosin, bituminous coal, pulverized wood, or sawdust. These have been our favorite materials, but we have experimented with and tried in practice for a longer or shorter time many other things. As to charcoal, one of the earliest things tried, we found it not so good as several other things. As to sulphur, we long ago abandoned its use. In gunpowder to be burned by itself, it is useful as facilitating ignition; but when combined with nitro-glycerine, it is not needed for this purpose, as the absorbent is readily fired by the exploding nitro-glycerine. For absorbing, it is no better than the nitrate, and not as good as charcoal, or any of the carbons or hydrocarbons used in absorbents. In other words, the sulphur in Vulcan powder is useless for any purpose except as an absorbent, and for that purpose would be better replaced by the same amount of nitrate and carbonaceous matter.

"The fine pulverization of the Vulcan absorbent is mainly for the purpose of increasing its absorbent capacity. Ordinary well-grained gunpowder will not safely take and hold over ten per cent of nitro-glycerine; but in the form of meal powder, its state before being grained, it will take and safely hold from 45 to 50 per cent. The pulverization may be considered as having another advantage for purposes of absorbents, to wit, the nitro-glycerine will be more intimately distributed in fine than in coarse materials, and the heat of the exploding oil will take effect quicker, and thus add force to the explosion.

"When Vulcan powder is exploded in practical use, an exploder is always used. This exploder, by the force of its explosion, explodes the nitro-glycerine contained in the powder precisely as the nitro-glycerine is exploded in No. 1 dynamite. The explosion of the nitro-glycerine in No. 1 does not affect the infusorial earth, which is incombustible, but in No. 2 Neptune, Vigorite, Vulcan, etc., the nitro-glycerine explosion produces high heat, which burns up the combustible absorbent. Any pulverized combustible would be consumed in like manner. Sawdust, charcoal, dried paper pulp, rosin, paraffine, pitch, and other carbons or hydrocarbons which have been used in making No. 2 are all completely consumed, just as is the Vulcan absorbent."

Robert J. Howe, a dealer in powder and various explosives, and formerly foreman of the Lafin Powder Company's mills, testified for the defendants in the Neptune Powder Company case as follows:

"Neptune powder compound, before adding nitro-glycerine, is in the form of powder-dust, and is an explosive in itself. If ten per cent, or any greater proportion of nitro-glycerine which it can retain, is added to it, the resulting compound is explosive, while infusorial earth must contain over thirty per cent of nitro-glycerine to explode at all, and a much larger proportion to make an effective explosive. Grained gunpowder, mealed gunpowder, gunpowder dust, or Neptune compound will not take up and retain more than about thirty per cent. Difference in temperature makes a difference in the retentive power of the substances. They will retain more in cold weather than in warm. My experience teaches me that about thirty per cent of nitro-glycerine is the quantity they can be relied upon in practice to retain. Dry pulverized nitrate of soda will not take up and retain thirty per cent of nitro-glycerine, but only about fifteen per cent. It might be made to retain, under certain conditions of temperature, twenty per cent; but when thirty per cent is added to it, it slowly trickles from it, and, upon being squeezed in the hand, it is discharged between the fingers.

"A mixture of 70 parts of either infusorial earth, charcoal, or sawdust with 30 parts of nitro-glycerine is inexplusive, yet either of the following mixtures are explosive:

Nitrate of soda.....	75 or 40 parts.
Charcoal.....	10
Nitro-glycerine.....	15 " 15 "
Sawdust.....	20 "

Also these are explosive:

Gunpowder dust.....	90 parts.
Neptune compound.....	90 "
Nitro-glycerine.....	10 " 10 "

"The nitro-glycerine does receive explosive aid from the Neptune compound, from gunpowder, from gunpowder dust, and from a mixture of sawdust and nitrate of soda. It is a well-known fact that gunpowder is more effective when exploded by percussion-caps than by simple fuse. Some consumers (contractors) always use percussion-caps for that purpose. For the same reason, caps are better to explode Neptune powder, but Neptune powder is largely used by some parties and exploded (without cap) by fuse alone. In such use, the powder of the Neptune powder explodes the nitro-glycerine of the Neptune powder in the same manner as indicated in the patent to Nobel, No. 50,617, filed 10th May, 1865."

Dr. Henry Morton, President of the Stevens Institute, testified, "that, while at North Adams, in December, 1875, I mixed 52 parts of nitro-glycerine with 48 parts of infusorial earth sent me by the complainants, and made this into a cartridge of the usual form, and inserted in this an 'exploder' or cap containing 16 grains of fulminating mercury. When this was fired in the usual way, the cartridge did not explode. I then placed another 'exploder' or cap containing 22 grains of the fulminate in the cartridge, and inclosed the whole in a short wrought-iron tube, tamp-



ing the ends with sand. On firing this 'exploder,' the iron tube was split open by the force of its explosion, but the mixture of infusorial earth and nitro-glycerine remained unaffected as before. I am, therefore, quite certain that a mixture of infusorial earth and nitro-glycerine in the proportions found by Dr. Hayes between the gunpowder and nitro-glycerine in the explosive compound [Neptune powder] of defendants, would be totally inexplodable."

Professor Morton then goes on to show that using various devices for increasing the explosive force of gunpowder is no new thing, and cites the following: "In the *Chemical News*, London, July 6th, 1866, on page 16, he finds as follows: Some experiments were in the first instance made with gunpowder, the grains of which had been saturated with nitro-glycerine. This powder burned much as usual, but with a brighter flame in open air. When confined in shells or blast-holes, greater effects were, however, produced with it than with ordinary gunpowder; its destructive action is described as having been from three to six times greater than that of powder.

"The same account is published in the *Proceedings of the Royal Institution*, vol. iv., p. 621, London, 1866. It is also published in the *Journal of the Franklin Institute*, Philadelphia, 1866, vol. 52, p. 275.

"This deponent further says that the increasing of the explosive force of gunpowder by the admixture of various bodies with it has been from time to time practiced from the early part of this century; thus, in the *Encyclopædia Britannica*, Edinburgh, 1815, is found an account of experiments made by Count Rumford. He used oil of turpentine, quicksilver, salt of tartar, sal ammoniac, and brass filings, with this object. In *Cutbush's Pyrotechny*, Philadelphia, 1825, p. 140, we find: Quicklime is said to increase the force of powder. Dr. Baine says that three ounces of pulverized quicklime being added to one pound of gunpowder, its force will be augmented one third. M. Vergnaud, in a work on fulminating powders in 1846, asserts that certain rifle powder consisted of gunpowder mixed with fulminate of mercury. In the *Mechanics' Magazine*, London, 1825, vol. 3, p. 275, we find a description of experiments with powder mixed with oil, which showed an increase of effect. In *Ure's Dictionary*, New York, 1853, p. 174, we find admixture of sawdust with gunpowder recommended as increasing its explosive force. In the *London Artisan* of 1862, we have a description of Mr. Bennet's improved blasting-powder, which consisted of a mixture in which lime was added to the usual ingredient of gunpowder. In the *American Repertory*, New York, 1841, Mr. Mayer proposes admixture of rosin with gunpowder to increase its effect in blasting."

The injunctions against the manufacturers of Neptune and Vulcan powders were granted. The value of this monopoly may be shown as follows: It is claimed that with proper exploders a dynamite composed of 30 per cent nitro-glycerine and 70 per cent meal powder will do as much work as a dynamite composed of 75 per cent of nitro-glycerine and 25 per cent of infusorial silica. The difference in cost may be estimated as follows:

Vulcan Powder.	
70 pounds of meal powder at .04.....	\$2.80
30 " nitro-glycerine at .40.....	12.00
100 pounds of powder cost.....	\$14.80
Dynamite No. 1.	
25 pounds of infusorial silica at .03.....	.75
75 " nitro-glycerine at .40.....	30.00
100 pounds of dynamite cost.....	\$30.75

In a previous suit, Judge Blatchford issued an injunction against the manufacture of the following powders:

	No. 1.	No. 2.
Nitro-glycerine.....	67.64	27.86
Cellulose (paper stock).....	16.82 (sawdust and charcoal)	5.59
Nitrate of soda.....	15.54	66.55

THE GENESIS OF TIN-STONE.

An interesting series of conclusions has been drawn by Mr. Robert L. Jack, government geologist of Queensland, in a well-illustrated detailed report on the tin mines of the Herberton, Western, and Thompson's Creek districts. He says: One fact comes out clearly and unmistakably from a detailed examination of the field. That fact is the intimate connection of the tin deposits with metamorphosed igneous dikes. Such dikes, emanating from a deep-seated reservoir of molten matter, forced their way under pressure into the fissures in the solid porphyry rock, and consolidated as basic igneous rocks. The basic rocks of the dikes seem to have undergone a gradual process of metamorphism. The dikes now consist mainly of quartzose chlorite and occasionally of quartzose serpentine. It may be inferred that they were originally consolidated as diorites or as rocks more or less of the basaltic type. The tin occurs in floors, veins, or pipes among the joint-planes of the dikes.

It is quite possible that the tin may have come up in the first instance with the molten mineral matter of the dike. In that case, it is probable that it was afterward dissolved and redeposited in the open joint-planes of the dike. A further separation and redistribution may have taken place simultaneously with the chemical or electric action that resulted in the metamorphism of the dikes. On the other hand, the tin may have first come up in solution, after the consolidation of the dikes, along the walls of the latter and among the fissures and joint-planes by which they were traversed, and been deposited there. A resolution of the tin ore would probably take place on the metamorphism of the dikes, and as the metamorphosed dikes had probably a new joint system developed in them, a further concentration of the ore may have taken place.

In any case, there is nothing to favor the supposition that waters containing tin in solution, and circulating through the upper portion of the earth's crust, failed to deposit tin ore in the porphyry, but deposited it immediately on meeting with the metamorphosed dikes. On the other hand, there are good grounds for supposing that the tin was carried up, either with the dikes in a molten condition, or was carried up in solution by mineral waters along the lines of the dikes. In either case, the permeation of the adjacent porphyry by the mineral waters may explain the occasional occurrence of tin ore in the "country-rock." In either case, as the dikes have originated in a deep-seated mass of

molten matter, they may be expected to carry the tin ore to greater depths than are ever likely to be reached by mining. The metamorphosed dikes are traversed by a series of dikes of quartz porphyry, strictly analogous to the elvans of Cornwall. They do not, however, appear to be, in this field, prolific sources of ore. It appears, however, that the elvans have occasionally served to reopen the basic dikes, and permit of a further local deposition of tin ore.

PENNSYLVANIA COAL STATISTICS.

The following tables show the production, number of employes, etc., of each coal-producing county of Pennsylvania for the year 1883, as determined by Hon. J. B. McCamant, Chief of the Bureau of Industrial Statistics at Harrisburg:

COUNTY.	Number of collieries.	Average number of days in operation during the year.	Total number of persons employed.	Amount paid in wages during the year.	Number of tons of coal produced during the year.
Carbon.....	17	195	4,587	\$1,628,817.77	1,616,991.02
Columbia.....	6	182½	1,660	564,122.90	519,551.00
Dauphin.....	3	268¾	1,781	612,095.00	668,864.00
Lackawanna.....	48	217	14,852	5,899,981.57	5,439,877.00
Luzerne.....	115	211	32,011	12,745,072.00	12,415,605.14
Northumberland.....	20	223¾	6,148	2,560,437.18	1,728,670.05
Schuylkill.....	100	235	20,069	9,497,126.28	7,603,967.05
Sullivan.....	1	240	200	89,000.00	75,000.00
Susquehanna.....					
	310	221¼	87,308	\$33,597,252.70	30,154,546 6-20

BITUMINOUS COAL AND COKE.

COUNTY.	No. of collier-ies.	Average No. of days in oper-ation.	Total No. per-sons em-ployed.	Amount paid in wages dur-ing the year.	No. tons of coal pro-duced during the year.	No. of coke-ovens.	No. tons of coke pro-duced during the year.
Alleghany.....	71	188	11,255	\$4,821,579.86	4,433,503¼	136	13,059
Armstrong.....	6	223	240	112,076.16	138,560	84	18,324
Beaver.....	7	234½	524	130,618.38	115,073	9	1,132
Bedford.....	8	193	612	188,514.00	244,190	38	37,644
Blair.....	5	179	514	141,252.54	149,585	222	56,787
Bradford.....	4	256	678	350,563.27	352,950¼		
Butler.....	3	177	194	77,082.00	73,038	50	10,000
Cambria.....	26	195	1,579	590,149.76	814,294	139	27,690
Cameron.....	1	138	202	29,467.80	23,535	20	1,228
Center.....	6	230	754	217,096.36	301,913	65	16,447¾
Clarion.....	12	181	1,114	344,208.06	333,131	142	56,336
Clearfield.....	35	186	4,822	1,447,381.40	2,063,730¼	86	14,188
Elk.....	5	256	1,358	511,981.00	507,583¼		
Fayette.....	52	246	5,241	2,248,815.47	2,517,586¼	5,881	2,089,428
Huntingdon.....	9	197	548	165,633.00	189,580	205	44,702
Jefferson.....	9	160	1,352	291,091.00	330,221		
Lawrence.....	3	186	162	52,147.00	61,498	82	10,953
Lycoming.....	1	260	450	203,029.92	184,556¼		
McKean.....	3	237	149	89,159.00	84,890		
Mercer.....	15	179	1,117	465,493.44	323,425¼		
Somerset.....	13	201	693	164,701.75	281,257¼	33	4,459
Tioga.....	8	227	2,513	1,216,429.00	1,186,778	200	41,688
Venango.....	3	211	130	41,218.00	26,523		
Washington.....	28	198	3,998	955,717.00	938,307	26	12,000
Westm'land.....	46	240	5,255	2,190,228.25	3,049,807	3,190	953,904
	381	207¼	45,454	\$17,014,624.36	18,729,817¼	10,617	3,380,972¼

\* Semi anthracite.

† Included in Lackawanna.

THE IRON-WORK OF THE PRODUCE EXCHANGE.

The inauguration of the new Produce Exchange building was a brilliant social and commercial event, and naturally occupied a good deal of space in the daily papers. Much has been said about the style and equipment of the edifice, as well as the ceremonies and orations, the fashion and the "refreshments," which consecrated it to commerce and corners in cereals. Strange to say, the sharp-eyed reporters overlooked the only thing about the building which is unique—the circumstance, namely, that the beautiful architectural iron-work, made by the Hecla Iron Works, Brooklyn, has been treated by the new Bower-Barff process, to protect it from rust. Of the nature of this process, our readers do not need to be informed. The papers of Mr. Anthony Bower, before the Institute of Mining Engineers, and of Professor Maynard, before the Society of Mechanical Engineers, together with reports and articles in the American and foreign press, have made it well known.

Messrs. Poulson & Eger, the proprietors of the Hecla Works, deserve great credit for their enterprise in more than one direction. Unostentatiously, and as a part of their private business, they have created for their own employes what amounts to a well-appointed school of design, and the result is seen in the artistic merit of their work. In fact, we know of no more illustrious instance of the high market value of beauty than the extraordinary growth of this establishment, within a very few years, from a small, ordinary foundry to a great atelier, abundantly worthy of the attention of connoisseurs. The capacities of iron for ornamental work have here been shown in a new light by the skill, taste, and enterprise of two iron-founders, who were not content to follow the path and copy the patterns of their trade.

It was natural that Messrs. Poulson & Eger should be the first in this country to test, and then to adopt, the Bower-Barff process. It supplies

the one thing lacking, to make architectural iron-work perfect. Grace and delicacy they had already attained; but a natural surface, proof against rust and needing no renewal, was still to be found. Having found it in the superficial conversion to magnetic oxide effected by the Bower-Barff process, they are greatly increased in their facilities of manufacture, and enriching the architecture of New York with numerous masterpieces, of which the Produce Exchange is the most striking.

The severest public test of the "rustless" iron work of this firm, so far, is perhaps at the Brooklyn end of the East River Bridge, where the railings on the stairways of the passenger-station have been exposed since its construction, without paint or other protection except the Bower-Barff treatment, to the damp salt air which so easily plays the mischief with iron structures along our water-front. These railings we recently examined, and found them so far unaffected.

#### FURNACE, MILL, AND FACTORY.

The Golden Gate Concentrator Company, of Boston, has been for some years engaged in the manufacture of concentrating machinery, and has made a special study of the subject of the concentration of ores by actual work in the mines, supplemented by a long series of laboratory tests of the different kinds of ores under conditions precisely the same as would occur in actual work. It has reached the conclusion that no single concentrator can be made that will meet the requirements of all the different classes of ores; that there must be a great range of adaptability, even in machines designed for some particular classes of ores, to meet their varying peculiarities; and that special appliances must in some cases be provided to enable any form of concentrator to cope with special peculiarities of such ores. To meet these difficulties, the Golden Gate Concentrator Company manufactures two forms of concentrator entirely different in principle. One of these is especially designed for the treatment of coarsely crushed galena, iron, and similar ores, carrying a considerable percentage of mineral—say from 10 to 90 per cent. The capacity of this form varies from about 30 to 100 tons daily. The other form is especially adapted for ores carrying gold, sulphurets, etc. The capacity of this machine varies from 20 to 80 tons daily. The company invites those in want of a concentrator to forward to it, freight prepaid, a sample of their ore—from 200 to 300 pounds is sufficient in most cases—and to see it run on a full-length table and to have assays made of the results.

Recent important orders taken by the Webster, Camp & Lane Machine Company, Akron, Ohio, have been as follows: For stack No. 1 of the Lucy Furnace Company, Pittsburg, now rebuilding, a heavy hoist and counter-balance and system of charging with skip. The cylinder is 13 inches by 15 inches, and the drum is 80 inches in diameter. For the Isabella Furnace Company, a No. 15 portable hoist, with 10-inch by 15-inch cylinder and 48-inch drum, for its coke-ovens; also No. 30 portable hoist for wire rope haulage from its coal mines. The cylinder is 12 inches by 15 inches, and there are two 72-inch by 30-inch drums.

The Colorado Iron-Works are about to erect branch works at Hailey, Idaho.

A portion of the lining of the Victoria furnace, at Goshen, Virginia, having fallen in, it has been blown out, and all mining and other work suspended until it is relined and repaired, requiring probably two months.

The Clifton Iron Company, of Talladega, Ala., has just contracted for the largest charcoal furnace in the South, to be built at the new town of Jenifer, on the East Tennessee and A. A. road, between Anniston and Talladega.

The Allentown iron-works were sold May 7th, for \$50,000, and were bought in for the bondholders, who will reorganize the company and put the works in operation again. The mortgage under which the sale was ordered amounts to \$500,000.

The steel-works in Sandusky, Ohio, will be changed to a nail-mill giving employment to 200 men.

Thomas H. & Z. H. Withers will erect a foundry and machine-shops at Marietta, Ga., for the purpose of making engines for gold mining and mill machinery, saw and planing-mills.

The West Lebanon Rolling-Mill Company, Limited, has purchased the Harrisburg Chain-Works, and will, it is reported, remove the entire establishment to Lebanon. About fifty hands will be employed.

The Gautier steel department of the Cambria Iron Company, at Johnstown, Pa., reports its business for the month of March, both in tonnage and value, as the largest ever known in the history of the company.

A stock company from New London, Conn., has leased the building recently occupied by the Reading Hardware Company in Reading, Pa., and is erecting the necessary machinery for the manufacture of all styles of tags and small springs. Fifty men will be employed at the start.

A company, embracing prominent Eastern and Western capitalists, secured a location in Birmingham, Ala., on which a large factory for the manufacture of car-wheels is to be erected. It is expected that the works will be in operation by July 1st.

The foundry, machine, and pattern-shop building, with contents, belonging to the Lynchburg Iron Company, Va., was destroyed by fire May 3d.

The capital stock of the old Virginia Nail-Works, at Lynchburg, has been increased to \$100,000.

The Springfield Iron Company has removed to the Commercial Safety Deposit Company's new building, corner of Monroe and Dearborn streets, Chicago, Ill.

The steel-works at Bessemer, Colo., shut down April 27th, for an indefinite period, and many employes are thrown out of work.

W. B. Pollock & Co., of Youngstown, Ohio, among other work, have orders for four boilers from the Brier Hill Iron and Coal Company. Two of them will be forty feet each, and two fifty feet in length.

Richard Hecksber & Co., of Philadelphia, are reported to be negotiating with the Philadelphia & Reading Coal and Iron Company for the lease of Swede furnace, on the main line of the Reading road.

At a recent meeting of the manufacturers of galvanized iron, at Pittsburg, Pa., an organization called the Galvanized Iron Association was formed. The rules adopted place the making of rates in the authority of the association, and all members are bound in honor to sustain them. The organization is regarded as strong, inasmuch as all but one firm—and a small one—are concerned. The plan does not necessarily include pooling. The uniform advance of rates is the first object to be attained.

The Greenville, Pa., rolling-mill was recently started up with from 10 to 15 of the 26 puddling-furnaces.

The Lechner Manufacturing Company, of Columbus, Ohio, has recently shipped a number of its mining machines to Canada, and has a regular and growing demand for its roller chainbelting.

Messrs. Edward Dewey & Co., of Boston, manufacturers of the Waters engine governor, have recently admitted Mr. R. B. Lincoln, Jr., as partner.

At a large meeting of the barbed wire manufacturers, held at St. Louis, Mo. May 8th, it was decided, owing to the increased cost of the raw material, to advance the price of wire a quarter of a cent.

#### LABOR AND WAGES.

The Workingmen's Protective Association of the Connellsville Coke Regions, has been formed with its headquarters at Scottsdale, Pa. It comprises a majority of the laborers in the coke regions, and its object is to protect the members against imported contract laborers, and to sustain wages against any reduction that may be offered by the operators.

The boys who go to school in the winter in the anthracite mining districts and go to work at slate-picking during the spring and summer, and who used to make from \$15 to \$20 a month, are finding it impossible to get their usual employment, as Hungarians are willing to do the same work for \$2 and \$2.50 a week.

This week will probably close up the coal trade on the Monongahela River. The mine of Joseph Walton & Co., in the second pool, shut down May 7th, and the works of O'Neil & Co., which have been idle several weeks on account of the reduction offered to the miners, will not resume until the fall trade opens. The miners of the fourth pool are still on strike, and the operators are making no effort toward a settlement. In consequence of the general stoppage, the tow-boats will be tied up in a few days and their crews discharged. Over 8000 miners will be thrown out of employment.

The four hundred Italian laborers on the new Schuylkill Valley Railroad, who recently struck for an increase of wages from \$1.25 to \$1.35 a day, have returned to work at \$1.15 a day.

The Union Pacific Railroad employes have resumed work, orders for the restoration of the old schedule of wages having been received.

#### RAILROAD NEWS.

Articles of incorporation of the Joliet, Aurora & Northwestern Railroad Company have been filed at Springfield, Ill. The proposed line is to run from a point in Hanover township, Lake County, Ind., on the Illinois boundary line, to the Mississippi, passing through Joliet and the counties of Kendall and Kane, via Aurora; thence through the counties of De Kalb, Ogle, Winnebago, Stephenson, and Jo Daviess. The principal office is to be at Joliet. The capital stock is \$2,000,000.

The option of extending the stock of the Nesquehoning Railroad Company, which is operated under a lease by the Lehigh Coal and Navigation Company, expired May 1st. The rent now guaranteed under the rental is 7 per cent of the 28,000 shares. About 18,000 shares have been extended.

The Rochester & Pittsburg Railroad has signed a contract to supply the New York Central Railroad with 80,000 tons of coal. Outside of the small contracts with wholesale dealers, the Rochester & Pittsburg now has contracts for the delivery of between 500,000 and 600,000 tons of coal.

On May 5th, right of way on the great black diamond system of railroads in Ohio was secured, and the work of survey on the Chicago, Parkersburg & Norfolk Division, between Parkersburg, West Va., and Clifton Forge, Va., will be commenced, giving a total mileage of 655 miles. New York and Philadelphia and Ohio, Virginia, and West Virginia capitalists are largely interested.

The stockholders of the Moshannon & Clearfield Railroad Company and the Tyrone & Clearfield Railroad Company have adopted articles of merger and consolidation under the name of the latter company.

The official statement of the earnings of the Philadelphia & Reading Railroad Company for March shows that the gross receipts were \$2,188,144; expenses, including rentals and interest, \$1,470,069; and the net earnings, \$718,075, an increase of \$273,332, compared with the same month last year. The receipts of the Coal and Iron Company for the month were \$914,465, and expenses, excluding interest, \$1,029,665, being a loss of \$115,200, as compared with a profit of \$11,758 for the corresponding month last year. The net earnings of both companies for the year to April 1st were \$2,597,635, a decrease, as compared with the corresponding period last year, of \$243,607. This statement includes the workings of the Central Railroad of New Jersey and branches, with working expenses, \$532,226; earnings, \$199,737; rentals for March, 1884, \$472,049; less for March, \$272,811.

Receivers have been appointed for the Alleghany Railroad. They will take immediate control of the road, and will operate it by order of the court. The debts of the Alleghany Valley Railroad amount to \$27,600,000, of which amount \$13,600,000 are due the Pennsylvania Railroad.

The Tennessee Coal, Iron, and Railroad Company's report for April shows coal received directly from the mines 9880 tons, and coke 9775 tons, making a total for the month of 19,655 tons, and for the year of 83,600 tons.

#### COAL TRADE NOTES.

##### ILLINOIS.

The Wilmington Coal Association, the headquarters of which are at Chicago, is the largest association of coal mining interests in the West. The twelve mines represented in the association produce about 6500 tons of coal a day. Most of the mines are at Braidwood. The facilities and resources of the association enable it readily to supply the railroad trade in Chicago and the Northwest, as well as to fill promptly orders for car-load lots for points in Illinois, Wisconsin, Minnesota, and Dakota.

The Streater Coal Association shipped 46,427 tons of coal during the month of April.

##### MARYLAND.

Detmold, Coney, Koontz, Big Vein, and Pekin mines all worked very well last month. Jackson worked full time. Midlothian mine is working steadily. Blaes Avon mine is working from half to three-quarter time. Work in Hoffman mine is slack. Work in the Miller mine has decreased. Hampshire mine is working about half or three-quarter time. Phoenix mine is doing very little. Work around Frostburg is improving. Alleghany mine started last week, being the first since the strike. Ocean mine is working full-time. Midland mine is working very well.

##### OHIO.

Reports from Steubenville state that the coal trade has improved a little during the past month. The Averick, Bustard's, and the High Shaft have worked very steadily. The Jefferson Iron-Works' shafts, about three-quarter time. The Stony Hollow shaft is shut down for an indefinite time. There is a rumor that some parties are looking after the purchase of the blast-furnace connected with the Stony Hollow shaft.

##### PENNSYLVANIA.

##### ANTHRACITE.

The stockholders of the Spring Mountain Coal Company, the property of which was recently sold to the Lehigh Valley Coal Company, have been notified to surrender their certificates of stock to the Union Trust Company of New York City, for redemption, and receive their pro rata interest in cash, namely, 52 per cent, or \$26 a share, on and after May 6th.

The Skidmore vein struck at Monitor colliery last February has since proved to be worthless.

R. Penn Smith, of the firm of R. P. Smith & Co., New York City, coal agents, has lately had built at Lehighton a large jig-house. He has made arrangements with the Lehigh Valley Coal Company and the Lehigh Coal and Navigation Company to take all their bony coal, which he proposes to grind up, jig, and then prepare it for market. At present, the greater part of the bony coal is dumped



along with rock as refuse. The works began operations about a week ago, and the result thus far has been highly satisfactory.

Preparations are making to resume work at the Black Ridge collieries at Conyngham station, which have been drowned out and abandoned since the spring of 1883. The colliery has been leased by Wentz, Leisenring & Dodson. It is probable that the work of pumping the water from the mines will be commenced very soon. A large force of men is at work cutting a new channel for the stream known as Weaver's Run, so as to change its course and cause it to empty into the Black Creek by crossing the swamp at a point about half a mile east of the breaker. This will obviate the danger of having the mines flooded by any future freshet or overflow of the stream referred to. When the new channel is completed and the surface water properly drained from that part of the swamp overlying the basin, it will only require a couple of weeks to dry out the mines and get ready to ship coal from the breaker. It is currently reported that the company will at once begin sinking a slope on the Buck Mountain vein, some 200 yards northwest of the breaker, and will make other improvements that will afford employment for a considerable number of miners and laborers.

Preparations are making at Beechwood colliery, New Castle, to put the place in working condition. It was supposed until recently that connections between the inside slope and surface would be effected by means of bore-holes. That plan has been abandoned, and a more logical one, it is thought, is now going into actual operation. It is intended to hoist from the interior slope with compressed air. Already the foundation is laid for the air-compressors. In a few months, it will probably be ready to ship coal again.

Brady's colliery worked about half-time last week.

The forest fires in the vicinity of Mine Hill Gap have ignited the dirt-bank at the colliery at that place, and the colliery is idle on that account. Three hundred men and boys are out of work. It is feared that, unless the fire can be cut off, the slope will be endangered.

#### COKE.

The coke trade has nothing new to report. There has been no material change since our last report, says the *Connellsville Courier*. The labor at all works belonging to or controlled by the pool is kept idle one day in the week, while that at the independent works makes full-time. This has given rise to some dissatisfaction. It is rumored that the pool labor will make a demand on its outside brethren not to work on Thursdays, but as yet no such demand has been made. Of the 9820 ovens in the region, there are 1454 idle.

John Husband has sold the coal under three acres of land in East Huntingdon to the Southwest Coke Company for \$2500.

#### VIRGINIA.

A dispatch from Pocahontas, dated May 8th, says that so far 117 bodies have been recovered. A large force is at work day and night.

#### WEST VIRGINIA.

Mr. Oscar Veazy, State Mine Inspector, who has just completed an official tour through the coal mines of that State, says that most of the mines are ventilated by "natural openings." That is to say, there are no regular systems of artificial ventilation employed. Ventilating fans are almost unknown, and even a furnace is a curiosity. The mine law of the State is crude, and the territory under Mr. Veazy's supervision so extensive that he complains that the operators can, if they choose, refuse to adopt any improvement for the ventilation of the mines or the security of the miners that he may suggest. He says also that very little gas is found in the mines, the accepted theory being that there is none to be found above water-level.

### GENERAL MINING NEWS.

#### ARIZONA.

##### COCHISE COUNTY—TOMBSTONE DISTRICT.

GRAND CENTRAL.—Dispatches to the San Francisco *Exchange* state that the mine was closed down April 29th. It is said that for the past four months the ore-bodies above the water-line had been growing poorer in grade, until the battery samples would not average \$12 a ton. Last month, the loss to the owners was \$23,000. No work could be done below the water-level, for the reason that the pumps could not control the water. At the present rate of wages, \$4 a day, the mine could not pay expenses, and the company would not run it at a loss any longer. The Miners' Union at Tombstone positively refuse to work at \$3 a day, the proposed reduction, and unless a compromise can be effected, the probabilities are, that the mine will remain closed until new pumps are put in—about six months. It is stated that both the Contention and Tough Nut mines will soon close.

##### GILA COUNTY.

OLD DOMINION.—A judgment of \$6692 was filed in New York by C. E. Brooks, May 5th. The product for April is reported to have been about 700,000 pounds of copper.

##### MOHAVE COUNTY.

The owners of the '84 claim, near Chloride, are working it, and have over a foot of galena assaying 23 ounces in silver and 55 per cent lead. This claim is the second extension south of the Schuykill mine.

One quarter interest in the Infallible mine, at Stockton, has been sold for \$1500.

##### PIMA COUNTY.

GUNTSIGHT.—The new company has been organized under the laws of Arizona, with a capital of \$2,000,000. Work at the mines is to begin at once.

HOLLAND.—The smelter started up on the first of May. It has been idle for the past three years.

##### PINAL COUNTY—QUINOTOA DISTRICT.

Senator Fair has just visited the mines of the Bonanza firm, and is greatly pleased with the outlook.

#### CALIFORNIA.

##### MONO COUNTY—BODIE DISTRICT.

There is considerable placer mining going on along the slopes of High Peak. BODIE CONSOLIDATED.—For the week ended April 26th, there were crushed at the mill 114 tons of ore and at the Bodie Tunnel mill 302 tons. The average assay of the pulp was \$49.87 and of tailings \$1.70. Most of the ore was taken from the Vulcan vein, which is looking well. The Bodie Consolidated mill has been shut down for the purpose of putting in new mortars, which will take about ten days.

STANDARD CONSOLIDATED.—There were extracted and shipped to the mill, during the week ended April 26th, 473 tons of ore.

##### NEVADA COUNTY.

The sum of \$5000 has been appropriated by this county to appeal the Woodruff case to the Supreme Court of the United States, and it is supposed that other mining counties will also aid in having the case retried.

##### SAN BERNARDINO COUNTY—PROVIDENCE DISTRICT.

The prospects of the district are reported to be steadily improving. The Mozart, Lucknow, Mineral Point, the Belle McGilroy, the Treasury and Morning Star, and other locations are looking well for the amount of work done.

BONANZA KING.—During the past month, two new strikes, showing large

bodies of rich ore, have been made in the mine. The company's mill is running steadily.

ROBINHOOD.—This mine adjoins the Bonanza King. It has a shaft down about 57 feet, having run through a vein of fine ore that dips to the east. The company has not yet cross-cut for the ledge.

#### CANADA.

##### PROVINCE OF NOVA SCOTIA.

Some promising gold discoveries have recently been made at Ellershouse, Hants County.

#### COLORADO.

##### CHAFFEE COUNTY.

CONTINENTAL DIVIDE.—Work has been resumed. The tunnel has been run in over 460 feet on a cross-cut, and it is expected to cut five claims this season.

SEDALIA.—An important strike of carbonates is reported. The deposit was reached after months of development along the vein.

U. S. TREASURY.—The tunnel, now in a thousand feet, is steadily pushed. Several veins have already been cut.

##### CLEAR CREEK COUNTY.

BAY STATE.—This mill, at Empire, has been leased for the purpose of locating custom ores.

STOVER.—Preparations are making to start up the old Stover mine, one of the Chicago Creek properties.

TERRIBLE.—The Silver Ore shaft is between 700 and 800 feet in depth. In the drift easterly from the bottom of the shaft, are disclosed from 4 to 6 inches of 250-ounce mineral, carrying fine-grained galena, gray copper, and some ruby silver. The main shaft is still sinking, and has now about reached the distance at which drifting easterly will at once begin. The level will be continued, for the purpose of intersecting the large ore-body known to exist ahead. It ranges from 8 to 18 inches in width, and mills from 800 to 400 ounces silver per ton.

##### GILPIN COUNTY.

ADELAIDE.—The sum of \$1400 was recently offered for an eighth interest in the lease of this mine. The last ore tested at the Bobtail mill, in Black Hawk, from this mine, averaged 16 ounces gold a cord. The Adelaide is among many other abandoned mines that had been lying idle for years until leased to the present parties.

CALIFORNIA.—The present depth of the main shaft is 1600 feet, making it the deepest of any in the State. Contracts will be let for cutting flats at the 1600-foot station, and levels will be driven each way. As soon as this work is completed, a contract will be let for sinking another additional 100 feet.

DENVER.—This company (limited) keeps 40 stamps of its mill employed in crushing mill-dirt, the average yield of which is 5 ounces gold per cord. The smelting ore nets an average of \$50 a ton.

FOURTH OF JULY.—The lessees have purchased the plant of machinery formerly used on the Swamp Angel mine, are moving it, and will place it over the shaft sunk several years ago. West of this, and presumably the same vein, parties have leased a property and will develop it.

REPUBLIC.—The twenty-five stamp mill has started up on ore from the Iron mine, which the company has been working since closing down its mill in November last. This mine produced during a period of ten months in 1883 nearly \$70,000, and although the ore did not average over two ounces a cord, yet the company, with the facilities at hand for transporting the ore from the mine to the mill, claim that a fair profit was realized.

##### GUNNISON COUNTY.

The discovery of silver in the Happy Cañon has caused great excitement in that neighborhood.

##### HINSDALE COUNTY.

CROOKES MINING AND SMELTING COMPANY.—Operations on the Ute have been suspended for the present. Development on the Ulé continues.

##### LAKE COUNTY.

The Leadville *Herald* reports the following:

BREECE.—No ore has been produced since the 19th instant. Work will probably be resumed again shortly. Regarding the closing down of the Colorado Coal and Iron Company's works, it is stated that it will not interfere with the sale of the product of the mine, as a contract is in force with the company for a specified period.

CHRYSOLITE.—The facilities for transporting ore from the Chrysolite mine being taxed to their utmost to supply the stamp-mill, no first-class ore is shipped temporarily from this property.

COLORADO No. 2.—The shaft is sinking to greater depth, and has passed through three feet of ore, and is at present penetrating a body of iron and low-grade contact matter. It is estimated that at least thirty days will elapse before the mine will begin to produce ore.

DUNKIN.—The mine is looking only fairly well, and the monthly production of ore is limited to from 100 to 200 tons of medium grade. New work is continually in progress, but so far has failed to disclose any extensive bonanzas.

ESTY, SAMPSON & HILL.—Numerous improvements have been made during the past month at this concentrating mill, in Big Evans Gulch, near the Elgin smelter. The mill will resume operations in a few days, and will doubtless be kept running all summer.

EVENING STAR.—The mine has begun to ship iron on its contracts to Salt Lake.

IRON HILL.—Some very fine ore is extracted and shipped from the Imes mines.

MAID OF ERIN.—The ore-shipments continue to average about twenty-five tons of ore a day. No effort is made to break ore in large quantities, as it could not be moved to the smelters if hoisted to the surface. The mine is, however, getting in excellent working condition, and the large stopes are carefully timbering. The owners of the Maid of Erin have received a check from the Adams Mining Company for over \$8000, in payment for ore extracted by the latter from within the territory embraced by the Maid of Erin location.

MATCHLESS.—During the past month, there were shipped 525 tons of ore to the Colorado Smelting Company of Pueblo. The bulk of this ore ran quite well, and the earnings of the mine for the month of April must have been considerable. In addition to the former resources of the mine, two new places have been opened, showing quite large ore-bodies.

MEYER.—This company has instituted suit against H. A. W. Tabor, S. H. Foss, Tim Foley, Samuel McMillen, principal stockholders of the former Glass-Pendery, now the Iroquois Mining Company, to recover \$13,493, an amount claimed to be due for ore extracted in a trespass on the Aetna claim of the Meyer Company by the miners at work in the Glass mine.

NEW TIGER.—Articles of incorporation have been filed by this company. The capital stock is \$1,000,000. Single assessments limited to one per cent of the capital stock of the company. Incorporators: Ernest Hoelke, Robert Bunsen, Julius Bunsen, Max Bohmer, and J. M. Maxwell. Principal office, Leadville.

ROBERT E. LEE.—Eight different leasers are working in the mine, and are taking out considerable good ore.

SEQUIN.—This mine, on Rock Hill, was sold at sheriff's sale May 2d.

SILVER CORB.—A force of 250 men is employed, and the production amounts to over one hundred tons of ore a day, ranging in value, above smelter's charges to from twelve to twenty dollars per ton.

## LA PLATA COUNTY.

Some fine developments have been made this winter in the La Plata and Junction Creek mines, and it is predicted that a large amount of ore will be shipped from them this summer.

## PITKIN COUNTY.

**TAM O'SHANTER.**—The following description is given of the Montezuma mine, the principal property of the Tam O'Shanter group: The mine is opened by an incline 360 feet long, from which eight levels have been run, averaging about 200 feet in length; about two thirds of the vein from the surface to the 100-foot level contains a fine smelting ore running from 50 to 80 ounces in silver and 45 per cent lead; the pay-streak averaging three feet; very little of this ground has been stoped. From the 100-foot level to the 175-foot level east of the line, there is a fine body of sulphuret ore carrying but little zinc and running ninety ounces in silver. From the 175-foot level to the bottom of the incline, which is about at water-level, the ore carries considerable zinc, and is low in silver; but in the lowest level running east, the ore improves, and in the bottom of this level there is fine galena ore running as high as 400 ounces in silver.

## SAN JUAN COUNTY.

**ECLIPSE.**—More machinery will be added to the concentrator. The company will work the Mountain Queen, Eclipse, and several other properties during the season. The concentrator has a capacity of seventy-five tons a day, and it is the intention to run it to its full capacity.

**LITTLE DORA.**—Operations will shortly be resumed.

## DAKOTA.

**BLUE LEAD.**—Work has been in progress upon this mine at Sheridan, and ore containing a high percentage of copper has been encountered.

**ETTA.**—This tin mine has been bought by New York capitalists for \$17,000.

**RICHMOND VS. SITTING BULL.**—This case, which has been before the court at Deadwood for some time, has been adjourned until the August term.

## IDAHO.

The \$20 rate on ores between Hailey and Omaha has again been rescinded, and a uniform rate of \$25 a ton given instead. This rate applies to all classes and grades of ore, base bullion, matte, and lead, from Hailey to Salt Lake, San Francisco, Denver, Omaha, and Council Bluffs. To Kansas City, the rate is \$26. But as the smelting-works there, says the *Wood River Times*, pay \$1 more a ton to sellers than works at any of the other points named above, the rate to that place is practically the same, as far as ore-sellers are concerned.

**CASTLE CREEK.**—Advices from the mine are encouraging and the outlook promising for a profitable season.

**HAILEY SMELTING WORKS.**—The site and plant of these works have been leased to Jabez Chase, superintendent and part owner of the Davitt Silver King group of mines. Mr. Chase proposes to erect concentrating and sampling-works, entirely for custom work.

**HOLYOKE.**—Satisfactory reports are received from the mine.

## MEXICO.

The Mexican *Financier* reports the following: The Fresnillo mine, at Pachuca, produced in the first quarter of this year \$33,327.18, while its expenses were \$38,714.78, making a loss of \$4887.52. Its output was 32 bars of silver, amounting to 3850 marks. The beneficiating hacienda of La Purisima Grande received during the first quarter of the year 3278 cargass of metal from the Guadalupe mine and annexes, 811 from Maravillas, 41 from San Buena, and 800 from Encino, with an average of 6, 9, 13, and 19 marks a monton. The Borda mine for the first quarter of the year produced 53 bars of silver worth \$58,827.28; expenses, \$63,177.34; loss, \$8550.16, which, added to its former debt, makes a balance against the mine of \$40,391.45.

The Legislature of Michoacan has repealed the law imposing a tax of one per cent on the coined gold and silver sent out of the State.

## MICHIGAN.

A very important increase in the facilities for rail transportation has been made during the past few months, which will conduce greatly to the advantage of the mines, both in reducing freight and assuring their prompt and adequate service. Since the season of 1883 closed, a second line has been completed from Marquette, and will be ready for service by the time the lake shipping season opens. A fine new ore-dock has also been built at Marquette, this making the third available for the ore traffic there. On the Menominee range, a double track has been put in for quite a distance along the line of the Chicago & North-western Railroad Company's branch, tapping that district—an improvement that will vastly enhance the carrying capacity of that line between the mines of that range and Escanaba. In view of the prospective competition, a reduction of fully 33½ per cent on ore freights has been announced. Other roads will probably tap the iron ranges in the course of the next twelve months.

## COPPER MINES.

**BELT.**—The stamp-mill has been running on rock from the Butler vein, and the yield so far has been 2 per cent of copper. The vein is reported to be from 30 to 40 feet wide, with copper distributed all through. The Knowlton vein on the north is looking, well, and will yield 1 per cent more copper than the Butler vein. The stamp-mill will be run night and day.

**CENTRAL.**—According to articles filed, this mining company of Keweenaw County has reincorporated under the mining law act of 1882.

## IRON MINES.

**BESSEMER.**—This exploring company will begin work on a belt now opened and worked by the Summit Iron Company, one and a half miles farther west.

**ERIE.**—The diamond drill that has been working at the mine has been closed down for a time.

**GREAT WESTERN.**—Shipments from the mine are made in a small way to furnaces.

**LANSING.**—New machinery is erecting. Two test-shafts, seventy feet deep, are sunk in the property, and both are in twenty feet of first-class red hematite ore. At present, men are at work sinking a main shaft, which will be continued to a depth of 100 feet, when cross-cutting will be commenced connecting the two pits.

**MINNESOTA.**—This company has employed at the Breiting and Stone mines, in the Vermilion District, about 200 men, and will soon increase the force to 250. Active mining operations are pushed, and by July it will have in the stock-piles there fully 60,000 tons of ore.

**PAINT RIVER.**—A small force is worked in the open pit, and the stock-pile contains between five and six thousand tons.

**YOUNGSTOWN.**—It is stated that a sale of 40,000 tons of ore has been made.

## MONTANA.

## BEAVER HEAD COUNTY.

**HECLA CONSOLIDATED.**—The furnaces have been shut down for repairs.

## MADISON COUNTY.

**PEDO.**—A strike has been made in the Pedo mine, Ramshorn Gulch. The vein has widened out to two feet in width. The ore, at a moderate estimate, it is said, will yield five hundred dollars a ton. Every run yet made on Pedo ore, both by arrastra and in the mill of the Virginia City Reduction Company, has netted Mr. Couch about \$100 a ton.

## MISSOULA COUNTY.

The Deep Cañon Mining District, which is situated in the foot-hills of the Bitter Root Mountains, was recently visited by a correspondent of the *Helena Herald*. He states that there are no developed claims in the district. Among the many recorded locations, the Elizabeth and the Carlew have received the most attention. Still, owing to their unskillful development, they are in a very unsatisfactory condition.

In the Sweat-house Mining District, some work has been done on the Bitter Root Prince mine. A shaft twenty-five feet deep has been sunk, and south of the shaft a tunnel has been run in forty feet. It was started with the view of tapping the ledge below the shaft, and wharf driven sixty feet more, should intersect the vertical line of the shaft 100 feet below its face.

The shaft sunk in the Pleasant View mine has attained a depth of 170 feet. Several levels have been run east and west from the face of the shaft. The mine is worked by a whim. Good ore is produced, and arrangements are making to ship two or three car-loads to Denver. A seam of this rich ore trends easterly from the upper east level to the lower level, ranging from four to fourteen inches wide.

The facilities for developing quartz mines in both the Deep Cañon and Sweat-house districts are the very best—an abundance of fine timber and water.

## SILVER BOW COUNTY.

According to the *Miner*, freight on crude ore from Butte to Omaha is \$16 per ton, a reduction of five dollars as compared with the previous rate. To Chicago, the rate is \$18.50, instead of \$23.50, as formerly. It is also understood that the Northern Pacific has made a corresponding reduction.

**ALICE.**—The eighty stamps are running on fair grade ore and reducing over one hundred tons daily. Late developments in the Magna Charta are of a flattering character. A body of ore has recently been opened in the face of the 200 and 300 west drifts, averaging six feet in width and assaying 65 ounces of silver to the ton.

**ANACONDA.**—During the month of April, the mine shipped to Swansea 3500 tons of ore.

**SILVER BOW.**—A rich strike is reported in the Gray Rock. Cross-cutting on the 300-foot level developed the fact that the lead at that depth is fourteen feet wide. Samples across the ledge assayed 194 ounces to the ton.

## NEVADA.

## EUREKA COUNTY.

**CHRISTIE.**—It is uncertain when work will be resumed at this mine. There is a large dump of tailings on hand that have been tested and found to be profitable for reduction. It was understood not very long ago that leaching-works would be erected by the Christie for the reduction of the tailings and ore for the mines, the cost of which, it was calculated, would be fully met by the profit on the tailings alone. Propositions were also made to the company to purchase the tailings dump.

**EUREKA TUNNEL.**—The property has not been redeemed by the company.

**RUBY HILL.**—The breast of the tunnel is in good-looking lime, with seams of gray sand all through it. This, at a point only 15 feet from the extensive body of iron that was cut through a short time ago, is a good indication.

## HUMBOLDT COUNTY.

**PARADISE VALLEY.**—The mill is running and the mines look well. It has been almost impossible to get ore to the mill owing to the bad roads. For some time past, no ore has been hauled from the Wild Goose, and there are several hundred tons of ore that will average \$100 to the ton on the dumps at that mine.

## STOREY COUNTY—COMSTOCK LODE.

At the Sierra Nevada, it is reported by the local papers, the west cross-cut No. 3 has been started on the 3100 level at a point 100 feet north of west cross-cut No. 2. It is not yet out far enough to cut the ore-streak found by west cross-cuts Nos. 1 and 2. The streak, where cut in No. 2 cross-cut, was of about the same width (10 to 12 feet) as in No. 1, but was more solid in structure. It is hoped that in No. 3 cross-cut a still further improvement may be shown.

West cross-cut No. 1, on the 3100 level of Union Consolidated, is out some 23 feet. It is still passing through vein porphyry, and has yet some distance to go to reach the ore-streaks found on the levels above. This is the only place where work is done in the mine.

The Gould & Curry folks have cleaned out and repaired the north drift from the Banner shaft at the 1200 level all the way out to the south line of the Consolidated Virginia. It is now turned over to J. P. Jones, to be extended into the old bonanza mines. From this drift, the Best & Belcher folks are running a cross-cut west into a large block of unexplored ground that shows good indications of containing ore.

At Gold Hill, the usual amount of ore is extracted by the leading companies, and all the mills on the Carson River are kept going to their full capacity.

At the Alta, the running of the diamond drill in the face of the west drift on the 2150 level is the only work doing. There were strong indications of water in the face of the east drift on the level, and work at that point was discontinued. As soon as the drilling west is finished, the drill will be put into the face of the east drift. Drifting will then be resumed west. Thus far, the only water found in the west drift was in the first 11 feet, and it amounts to but two inches. While the cages are not used, the hoisting tanks have been put on, as by so doing the work is made lighter for the pumps.

## WHITE PINE COUNTY.

**MONITOR.**—The company's shaft is down 130 feet, with two connecting drifts from the ore-vein, which, in coming in contact with the eastern porphyry wall, takes an abrupt turn to the west. The mill has started up.

## UTAH.

## BOX ELDER COUNTY.

The cañon roads are so bad, and the snow so deep around the mines at Bing-ham and in other districts, that ore cannot be sent to the smelters, and the stock on hand at the furnaces is getting very low.

## JUAB COUNTY.

The general outlook at Silver City for the coming season is encouraging. The mines that are worked show a very marked improvement in the grade of the ore extracted as depth is attained, and in the increase of the output of ore. Two water-jacket furnaces are to be erected for smelting copper ore.

The American Eagle mine (once the Mammoth Copperopolis) has suspended operations. The Black Dragon mine continues to produce quantities of fluxing for smelting-works in and about Silver City and Sandy.

## SUMMIT COUNTY.

**EMPIRE.**—This mine, which in past years has been prominently before the public and which in February, 1883, was attached for indebtedness and passed out of the hands of the original company, has been incorporated by a new company with a capital of \$2,000,000. Operations will shortly be resumed. The work will be prosecuted with an air-compressor and Burleigh drills, and sinking the shaft will be continued. Nearly all the water is out of the mine, so that none of the former trouble with that will be experienced, and the expense will be thus greatly reduced from what it formerly was. About 100 men will be employed at the outset.

**SCOTT HILL CONSOLIDATED.**—This company has been organized with a capital stock of \$3,000,000, to engage in mining at Park City. The company owns seven claims on Scott Hill, lying west of Crescent Hill, and it is proposed soon to begin developing the claims.



**FINANCIAL.**

**Gold and Silver Stocks.**

NEW YORK, Friday Evening, May 9.

There was quite a reaction in the mining market this week, compared with last, as regards both business and prices. In fact, there was hardly any market to speak of, and every thing appertaining to mining stocks was exceedingly dull and uninteresting. The aggregate number of sales was but 69,800, as against 155,020 last week, and when it is considered that the dealings in some of the low-priced shares run up into the thousands, the reader can gain some idea of business transacted in the general list. Horn-Silver was rather weak, but this is owing to its selling ex dividend. Iron Silver sold at stronger prices than for some little time past. Navajo was also stronger. The Comstock shares took another turn this week, and were generally weak under small sales. The Leadville stocks were steady, while the Bodie stocks ruled at weak prices. The transactions in Rappahannock reach a very high figure, and the stock remains strong. We give a complete summary of the market below.

The Comstock shares suffered a decline from last week's strong prices, and were generally weak. They were but moderately dealt in. California sold from 25@21c, with a small business. Consolidated Virginia was quiet and irregular, selling from 24@20@21c. Sierra Nevada was weak, selling from \$2.10@\$1.45, under a small business. Union Consolidated also sold at weak prices; it was quoted from \$2.15@\$1.85. Mexican was quiet and steady, selling from \$1@\$.10, assessment unpaid. Ophir was moderately dealt in, and was weak; it sold from \$1.70@\$1.45. Hale & Norcross records a small business at steady prices; it sold from \$2.50@\$2.25. Yellow Jacket sold at \$2.25, and Best & Belcher at \$1.70. Sutro Tunnel was moderately dealt in at weak prices, selling from 14@12c.

The Leadville stocks remain quiet, with but little change in prices. Chrysolite was quiet and steady, selling from 90@98c. Dunkin sold from 20@14c. Brece was moderately dealt in at steady prices; it sold from 30@25@29c. Iron Silver was strong, under a fair business, selling from 99c.@\$.1. Leadville sold at 35c. Little Chief sold at strong prices under a small business; it was quoted from 42@55c. Little Pittsburg sold at 35c. The annual report of this company shows for the year's working the following results: Receipts for ore, \$103,039.48; disbursements, \$101,119.59. The assets figure up to \$70,460.62, including \$47,139.81 cash in New York and \$1558.73 cash in Leadville.

The Bodie stocks were rather inclined to weakness, and were but moderately dealt in. Bodie Consolidated was quiet and weak, selling from \$4.65@\$3.75. Bulwer sold at irregular prices, with a small business; it was quoted from 65@45@55c. Standard was quiet and weak, selling from \$1.50@\$1.25.

The Tuscarora stocks were quiet and steady. Grand Prize sold at 25c. Belle Isle was quiet and steady, selling from 38@35@39c. Navajo sold at strong prices under a small business; it was quoted from \$2.50@\$2.75.

In the miscellaneous list, Eureka Consolidated was quiet and strong, selling from \$4@\$4.25@\$4.10. Green Mountain sold at steady prices, with a small business; it was quoted from \$2.05@\$2. Hall-Anderson records a sale of 300 shares to-day at \$1.40. Horn-Silver was actively dealt in, and was weak; it sold from \$7.25@\$6.13, dividend unpaid, and from \$5.63@\$5.38, dividend paid. Robinson sold at 20c., and was almost neglected. Stormont records a small sale at 10c.

Barcelona was quiet and steady, selling from 14@16c. Central Arizona was a little strong, selling from 20@27c., under a small business. Eastern Oregon sold at 3c. Harlem was quiet and steady, selling from 4@5c. Lacrosse also sold at steady prices, and was moderately dealt in; it was sold from 15@13c. Oriental & Miller sold at 18c. Rappahannock was very actively dealt in at strong prices; it sold from 18@20@19c.

**MEETINGS.**

The following companies will hold their annual meetings for the election of trustees and the transaction of other business, at the times mentioned:

Halle Gold Mining Company, No. 151 Broadway, New York City, May 13th, from twelve to one o'clock P.M.

Jocunita Mining Company, No. 15 Broad street, New York City, May 14th, at twelve o'clock M.

Old Dominion Copper Mining Company, No. 83 Maiden Lane, New York City. An adjourned stockholders' meeting for the purpose of completing the business of the last annual meeting in the matter of investigation of the affairs and accounts of the company, the matter of mortgaging the property, and any and all other matters, a ratification of the accounts being desired at the time of delivering the bonds authorized. May 22d, at eleven o'clock A.M.

Pennsylvania Coal Company, at the office of the company, Hawley, Wayne County, Pa., June 10th, from three to four o'clock P.M.

Ridgeview Coal and Coke Company, No. 267 South Fourth street, Philadelphia, Pa., May 13th, at twelve o'clock M.

**DIVIDENDS.**

Bonanza King Consolidated Mining Company, of California, has declared dividend No. 6 of twenty-five cents a share, payable May 15th. Eastern stockholders of record may be paid at the office of Laidlaw & Co., No. 14 Wall street, New York.

Delaware & Hudson Canal Company will redeem at par and accrued interest the bonds falling due July 1st, 1884.

Paradise Valley Mining Company, of Nevada, has declared a dividend (No. 3) of ten cents a share, payable April 28th, at San Francisco.

Plymouth Consolidated Gold Mining Company, of California, has declared its regular monthly dividend (No. 12) of \$50,000, or fifty cents a share, payable on demand.

Small Hopes Consolidated Mining Company, of Colorado, has declared a dividend of \$50,000, or twenty cents a share, payable May 13th.

**PIPE LINE CERTIFICATES.**

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week:

On last Saturday morning, the market opened at 99 3/4c. and sold up to \$1.01 1/4, closing \$1.01 1/2. Monday morning, it opened up \$1.02 1/2, and touched \$1.03 1/2, which was the climax of the sharp advance from 94 1/2c. on April 30th. Tuesday, when the failures of the Marine Bank and of Grant & Ward were announced, a panic ensued in oil, and it declined from \$1.02 1/2 to 96 1/2c. Wednesday, this week feeling continued, and 95c. was the lowest point it touched, so that within one week it made the round trip 94 1/2c. to \$1.03 1/2, back to 95c. On Thursday, the market recovered somewhat from the depression, selling up to 98 1/2c., but breaking badly to 95 1/2@96c. at the close. To-day, it opened at 95 1/2c., sold up to 97c., and closed 96c., with numerous minor fluctuations. The market is not very decided in character, and the trade is mixed as to the immediate course of prices.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
May 3....	\$0.99 1/4	\$1.01 1/4	\$0.99 1/4	\$1.01 1/2	8,258,000
5....	1.02 1/2	1.03 1/2	1.01 1/2	1.01 1/2	7,980,000
6....	1.02	1.02 1/2	.96 1/2	.96 1/2	13,219,000
7....	.96 1/2	.97 1/2	.95	.96 1/2	11,299,000
8....	.96 1/2	.98 1/2	.95 1/2	.96	11,479,000
9....	.95 1/2	.97	.95 1/2	.96	6,755,000
Total sales .....					58,980,000

**Copper and Silver Stocks.**

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, May 8.

There has been but little activity in the market for copper stocks the past week, and dealings have been confined to the two leading dividend-paying mines, which have ruled steady in price, developing no special feature. The large sale of ingot copper reported last week has had a tendency to steady the market, and we should not be surprised to see higher quotations for the best stocks in the near future. Calumet & Hecla has ruled very steady at \$178@\$176, closing at the former price for small lots. The sales have aggregated about 300 shares the past week, against 150 shares last week, showing that the market will take the stock readily at about these figures. The report that the company would reduce its product one half is denied; on the contrary, it is believed that it will endeavor to increase the output, in order to offset the decline in price.

Quincy is very firm at \$36@\$36 1/2, with sales of about 100 shares in lots. The April product was about 250 tons. Osceola advanced on small sales from \$12 1/2@\$14, and Pewabic declined from \$1 1/2@\$1 1/4 for 50 shares. The reports regarding Pewabic are to the effect that the mine is showing some improvement, and the reorganization proceedings are in statu quo. Franklin has not put in an appearance this week; \$8 1/2 is bid freely for it, but there is no disposition to part with it at that price; in fact, there has been no stock offered. The mine continues to look well and the prospects are encouraging. The rest of the list has been entirely neglected.

In silver mining stocks, there is practically nothing doing; not a sale reported for the week at the Boston Mining Stock Exchange; while at the Mining Board, dullness reigns supreme. A few quotations are made daily of two or three stocks, but actual sales are few and far between. Bowman Silver sells at 15@16c. Sullivan, 9@10c. Empire, 8@10c. Dunkin, 18@20c.

3 P.M.—The market is unchanged. Calumet & Hecla sold at \$178. A small lot of Huron at 75c. Allouez, offered at \$1. Atlantic, \$7 1/2 bid. Franklin, \$8 1/2 bid, \$10 asked. Huron, \$1 asked. Osceola, \$13 bid, \$15 asked. Pewabic, \$1 1/2 bid, \$1 1/4 asked. Quincy, \$36 bid.

**SAN FRANCISCO MINING STOCK QUOTATIONS.**

*Daily Range of Prices for the Week.*

NAME OF COMPANY.	CLOSING QUOTATIONS.					
	May 2.	May 3.	May 5.	May 6.	May 7.	May 8.
Albion.....						
Alpha.....						
Alta.....	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Argenta.....						
Bechtel.....						
Belcher.....	1 1/2		1 1/2		1	1
Belle Isle.....						
Best & Belcher.....	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Bodie.....	4 1/4	4 1/4	3 3/4	3 3/4	3 3/4	3 3/4
Bullion.....						
Bulwer.....						
California.....	.20	.20		.20	.20	.20
Chollar.....	1 1/2	1 1/2	1 1/4	1 1/4	1 1/4	1
Con. Pacific.....						
Con. Virginia.....	.25	.25	.25	.25	.25	.20
Crown Point.....	1 1/2	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
Day.....	2	2	2	2 1/2	2 1/2	2 1/2
Elko Cons.....						
Eureka Cons.....						
Exchequer.....						
Gould & Curry.....	1 1/2	1 1/2	1 1/2	1 1/4	1 1/2	1 1/4
Grand Prize.....						
Hale & Norcross.....	2 1/2	2 1/2	2 1/2	2 1/4	2	1 1/2
Independence.....						
Martin White.....				.55		.45
Mexican.....	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1
Mono.....						
Mount Diablo.....						2 1/2
Navajo.....	2 1/2	2 1/2	2 1/2		2 1/4	2 1/4
Northern Belle.....						
North Belle Isle.....						
Ophir.....	.50	.50	1 1/2	1 1/2	1 1/4	1 1/4
Overman.....						
Potosi.....	.65	.65	.55	.60	.55	.50
Savage.....	.45	.50	.40	.80	.80	.70
Scorpion.....						
Sierra Nevada.....	1 1/2	2	1 1/4	1 1/4	1 1/2	1 1/2
Silver King.....						
Tip Top.....						
Union Cons.....	2 1/2	2 1/2	2	2	1 1/2	1 1/4
Utah.....	1 1/2			1 1/2		
Wales Cons.....						
Yellow Jacket.....	2	2 1/2	2	2	1 1/2	1 1/4

**BULLION MARKET.**

NEW YORK, Friday Evening, May 9.

DATE.	LONDON.		N. Y.		
	Pence.	Cents.	Pence.	Cents.	
May 3	50 1/2	111 1/2	May 7	50 1/2	111 1/2
5	50 1/2	111 1/2	8	50 13-16	111 1/2
6	50 1/2	111 1/2	9	50 13-16	111 1/2

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains at 2 1/2 per cent. During the week, the bank gained £59,000 bullion, and the proportion of its reserve to its liabilities was reduced from 48 1/2 to 48 per cent, against 33 1/2 per cent at this date last year. The weekly statement of the Bank of France shows gains of 14,787,000 francs gold, and 1,870,000 francs silver.

United States Mint at Philadelphia.—The coinage at the Mint for the month of April aggregated 6,204,000 pieces, valued at \$1,308,350. This amount was made up of 9000 eagles, 1,100,000 silver dollars, 100,

000 dimes, 1,335,000 five cent pieces, and 3,660,000 pennies.

United States Assay-Office at New York.—Statement of business for the month ended April 30th, 1884:

Deposits of gold:	
Foreign coin	\$33,000
Foreign bullion	50,000
United States bullion	375,000
United States bullion (re-deposits)	115,000
Jewelers' bars	31,000
Refined gold	142,000—\$746,000
Deposits of silver:	
Jewelers' bars	15,000
Foreign coin	5,000
Foreign bullion	37,500
United States bullion (contained in gold)	6,700
United States bullion (re-deposits):	4,000
Arizona	10,000
Colorado	25,000
Lake Superior	1,100
Montana	117,000
New Mexico	6,000
Utah	137,000
Refined silver	39,100—404,000
Total deposits	\$1,150,000
Gold bars stamped	\$6,707,324
Silver bars stamped	333,333—\$7,040,637

BULLION PRODUCTION FOR 1884.

MINES.	States.	Month of March.		Year from Jan. 1st, 1884.
		\$	oz.	
*Alice, g. s.	Mont.	89,465	298,761	
*Belmont	Mont.		8,081	
*Bodie, g.	Cal.	26,293	88,976	
*Bonanza King, s.	Cal.	36,844	135,161	
*Boston & Montana, g.	Mont.	56,114	132,813	
*Chrysolite, s. l.	Colo.	16,023	32,278	
*Consolidated Bobtail, g.	Colo.	7,915	24,326	
*Contention, s. c.	Ariz.	54,872	195,164	
*Deadwood-Terra, g.	Dak.	40,409	128,703	
*Derbec Blue Gravel, g. s.	Colo.	9,628	29,296	
*Father de Smet, g.	Dak.	39,898	96,075	
*Grand Prize, s.	Nev.		25,000	
*Hecla Cons., g. s. l.	Mont.		162,178	
*Homestake, g.	Dak.	99,982	301,053	
*Hope, s.	Mont.	2,547	17,980	
*Horn-Silver, s. l.	Utah	258,087	582,087	
*Iron Silver, s. l.	Colo.	53,287	184,189	
*Kentuck, g. s.	Nev.	3,906	11,639	
*Lexington, g. s.	Mont.	98,494	299,896	
*Little Pittsburg, s.	Colo.	7,189	25,134	
*Moulton, s.	Mont.		122,000	
*Mount Diablo, s.	Nev.		24,820	
*Navajo, g. s.	Nev.	13,877	85,750	
*Ontario, s. l.	Utah	197,727	536,205	
*Original, s. c.	Mont.		11,135	
*Oxford, g.	N. S.	3,102	10,262	
*Paradise Valley, s. g.	Nev.	16,322	45,164	
*Plymouth Consolidated, g.	Cal.	89,277	275,778	
*South Yuba, g.	Cal.	3,779	5,819	
*Syndicate, g. s.	Cal.	5,982	35,841	
*Tomstone, s. l.	Ariz.		122,756	
United Gregory, g.	Colo.		7,174	
Total amount of shipments to date			\$4,061,474	

\* Official. † Assay value. ‡ Not including value of lead. G. Gold; S. Silver; L. Lead; C. Copper.

METALS.

NEW YORK, Friday Evening, May 9.

**Copper.**—Business has been quiet, as it usually is after the closing of large contracts. The Lake companies are holding at 14½c., but copper is obtainable at 14¼@14½c., and it is stated that under special circumstances 14½c. has been accepted for small lots. In other brands, outside cheap lots have disappeared, and the range now is 13¼@13½c.

England has receded a little so far as Chili Bars are concerned, the latest cable being £56 15s., while Best Selected is quoted at £63.

**Tin.**—There has been a fair volume of business during the week, the market closing firm at 19¼@19½c. for cash spot lots of Straits, while futures are 19½c. England cables £86.

**Lead.**—We are informed that during the week about 500 tons sold at 3-55@3-52½c., and it is rumored that some was taken at 3-50c. It is insisted in other quarters, however, that lead can not be had for less than 3-60c. It is certain that the recent heavy sales have supplied consumers very liberally, and that they will not be forced to make any effort to take some of the lead that is continually coming forward. London cables £11 2s. 6d. for Soft Spanish.

From St. Louis, Messrs. John Wahl & Co. telegraph to us as follows:

A dull and easier feeling has prevailed since we reported a week ago. Sales for the week run up to 850 tons of Refined Lead at 3-40c. for this month's and June delivery, 100 tons of Common Lead at 3-37½c. Receipts during the week foot up to 850 tons, against 490 tons during the previous week.

**Spelter.**—This metal has improved slightly, the

low offerings having ceased. We quote 4-50@4-60c. London cables £14 10s. for Silesia.

**Antimony.**—There has been no change. England cables £43 for Hallett's.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, May 9.

**American Pig.**—The market remains practically unchanged, firm for the best brands, notably of No. 1 and Gray Forge, while No. 2 Foundry is in more ample supply.

We quote No. 1 Foundry at \$20@21; No. 2, \$19@19.50; and Gray Forge, \$17.50@18.50. There have been no sales of domestic Bessemer pig. Foreign remains quiet at \$20 ex ship. Twenty per cent Spiegel is quoted in round lots at \$23@28.50 ex ship, some sales having been made at the lower figure. Ferro-manganese, 45 per cent, is worth \$45.

At the Metal Exchange, the following transactions were recorded: Saturday, May 3d, 100 tons pig-iron certificates, February, \$18.50; 100 tons pig-iron certificates, February, \$18.62½; 100 tons pig-iron certificates, February, \$18.62½. Wednesday, May 7th, 200 tons certificates, September delivery, \$18.37½; 100 tons certificates, September delivery, \$18.50; 200 tons certificates, December delivery, \$18.62½.

**Scotch Pig.**—There is no change whatever to note.

We quote ex ship and to arrive: Coltness, \$22@22.50; Langloan, \$22@22.50; Summerlee, \$21.50; Dalmellington, \$20.75; Gartsherrie, \$21.50@22; Eglinton, \$20.25; and Glengarnock, \$22@22.25.

At the Metal Exchange, the following cable quotations have been received: Coltness, 56s. 6d.; Langloan, 52s. 6d.; Summerlee, 51s.; Gartsherrie, 51s. 6d.; Glengarnock, at Ardrossan, 51s.; Dalmellington, 47s. 6d.; and Eglinton, 45s. Warrants, 41s. 7d.

**Steel Rails.**—There have been some transactions during the week at a figure equivalent to \$32.50 at mill.

**Old Rails.**—We quote \$19.50@20 ex ship.

Philadelphia.

May 9.

[From our Special Correspondent.]

**Pig-Iron.**—The tariff vote on Tuesday, in Congress, has created a much more hopeful feeling in iron trade circles, but it remains to be seen whether any actual improvement in business or prices will follow. Consumers are following their old policy of buying for current requirements. Two or three parties are asking a little advance for standard and special makes of iron. Good irons are not as abundant as they have been, and asking prices are more readily obtained, but not for future requirements. No. 1 Foundry can be had at \$20; No. 2, \$18.50. Mill irons are abundant at \$18. Better prices are occasionally paid. Inferior irons are offered at concessions. Taking the trade as a whole, there is not much change, but we are nearer the possibility of an improvement. A large sale of Red Short was made at \$18, delivered.

**Foreign Irons.**—Spiegeleisen is offered at \$28.50, with buyers prepared to pay \$28. It is said that inquiries cover some 15,000 tons. Nothing will be done above \$28 at tide-water for Bessemer; \$19.50 might be paid, but buyers will not talk business above this.

**Blooms.**—Anthracite have sold at \$44@45. Buyers are in the market for Charcoal at \$54. Average price, \$55@56.

**Muck-Bars.**—About \$31 would be paid for ordinary Muck-Bars.

**Bar Iron.**—Country mills have sold Common iron at 1-70c. Some other concerns have sold at 2c. for Refined. Business is between these figures. Some parties are trying to push down prices, but can not find sellers below current rates.

**Plate and Tank Iron.**—To-day's quotations are given at 2-15@2-25c. for Tank and Boat Plate, according to size of orders. A good order for Shell would be taken at 2-70c. Flange, 3-75c.; Fire-Box, 4-75c. Prices are as low for plates as they can go. Alan Ward & Co. are offering steel plates on the market.

**Structural Shapes.**—Quotations are 22c. for Angles; Tees, 3-75c.; Beams and Channels, 3-50c. Manufacturers are sure of a good summer's business, although there is no explanation as to the causes of delay on

the large business which has been expected for two or three months.

**Sheet-Iron.**—Card rates, 3¼@4c. for Best Refined. The mills are fairly busy. A good deal of business has been done at sharp concessions from card rates, and small buyers will now pay good figures for prompt delivery orders.

**Wrought-Iron Pipe.**—Harmony prevails among the pipe manufacturers, and card rates are adhered to, with an improvement in business reported. Some large orders will probably be placed in a few days.

**Steel Rails.**—Prices are steady at the drop to \$33@33.50, although at the latter figure very little business is done in a large way, as rail buyers talk with confidence of being able to buy at \$32.50, and even less. If the disorganizers in and out of Congress do no more harm this season, there will be some heavy business done in steel rails during the summer, for late fall and winter work.

**Old Rails.**—Only small lots are selling at a decline, and holders are not able to get their prices. Figures range from \$21.50@22.50. One or two large lots have sold, and there are negotiations pending for several more, for interior shipment. Some two or three railroad companies are tired of holding on for impossible prices.

**Nails.**—There is no change in quotations, although jobbers are pressing for concessions, and will probably get them.

Pittsburg.

May 8.

[From our Special Correspondent.]

**Pig-Iron.**—The state of this industry is a pretty sure sign by which to judge the general iron markets. I can quote you prices on some grades as follows, which are slight reductions on the quotations of a recent period: Cinder Mix, \$17.25@17.50 a ton, four months. All Ore, \$18.25@18.50 a ton, four months. Bessemer, \$20 a ton, four months. Native Ore, coke, \$17 a ton, four months. Charcoal, \$22.50@25 a ton, four months. Cold-Blast Charcoal, \$24@29 a ton, four months. Business is of a hand-to-mouth character, and prices may be said to be easy. The inquiry is all for small lots for immediate delivery, and big consumers are purchasing at the rate of one tenth their usual lots. There is no accumulation of stocks in first hands, and production continues light, as the furnaces in blast are mostly employed in working up prior contracts, and there is not much encouragement for those out of blast to start up. The wages question in the iron mills must be fixed up before the present condition changes. The report of sales of pig last week aggregates 1862 tons, which does not equal the sales of the week previous. The end of tariff legislation, or tariff talk more properly, in Congress, had no perceptible effect on the Pittsburg markets, as it had been discounted months ago. No one here expected any thing else than that which has occurred. The general lack of confidence did more injury to the trade than horizontal tariff bills.

**Steel Rails.**—It seems strange, possibly, that Bessemer rails are still quotable here at \$35 a ton, with no sales below that at cash or otherwise reported, when in the East for three or more weeks prices of \$33 and \$33.50 a ton for small lots are reported. As far as I can learn, there are no sales of consequence made here, which may account for the price; but, from talk I have heard, I am inclined to believe that rails can be bought at less than \$35; but do not say I told you! Large orders, it is said, are held back in expectation of lower prices.

**Manufactured Iron.**—Business is still dull and disappointing, which is no change from last week. The prospects of immediate improvement are not flattering. In bridge-works and some branches of structural iron, the mills are fairly busy, the Keystone Bridge-Works particularly, which, in addition to other work, have just taken contracts for the construction of two miles of bridge material. There would be a more general suspension of operations in some of the mills were it not that the manufacturers expect a reduction in wages.

**Nails.**—The trade is backward and prices unchanged. Orders are arriving more freely perhaps, but they are in small lots.

**Scrap.**—Quotable at \$21 net ton. A sale of 1000 tons No. 1 wrought at \$21, four months, is reported. There is nothing to chronicle in other lines.





## COAL TRADE REVIEW.

NEW YORK, Friday Evening, May 9.

**Anthracite.**

There are a number of indications, which as yet have not assumed any definite shape, that point to a further weakening of the market. Business is very dull, and is forced only by concessions, in which, of course, individual operators lead and take the principal part. It is rumored, however, that the companies are not quite as firm as they have been, and there is some talk on the part of some of them of making the week for which three-day work only was contemplated one of entire cessation of mining operations. This is significant at a time when work is only about to be resumed after a week's restriction. It indicates that there are some at least who are frank enough to avow that the remedy for overproduction contemplated is not even strong enough. Next week's developments will go far to clear up this point. On the other hand, it is well known that stocks in the West have gone very low, and that those markets are capable of taking and probably will take large quantities of coal. The policy of the companies shipping in that direction will, of course, be to relieve sea-board markets of heavy shipments to that quarter, and the effect of this movement, also, should, as a counterbalancing influence, become apparent at an early date.

**Bituminous.**

There are no new features. We can not record any improvement in prices, however satisfactory the volume of business done may be. Only a small number of unimportant contracts remain to be filled.

**Philadelphia.**

May 9.

[From our Special Correspondent.]

This week's suspension at the mines, together with the three other days this month, will, it is stated by a reliable authority, place the coal trade on a basis where it will not be necessary to shade prices or resort to more than the programme restriction. New England buyers are preparing to buy more heavily than at any time since the opening of the year. Some of the larger dealers there have admitted that their fluctuating policy of delay has not been of any advantage to them, and that they might as well purchase heavily now as at any time. A good many inquiries for large lots are therefore now coming in, and will probably lead to business next week or the week after. Stocks in New England are known to be pretty well depleted, and representatives of the coal interests say that there is nothing to be gained by further delay. A goodly number of orders have arrived this week. Vessels are still scarce and freights high. Stocks at Port Richmond are over 180,000 tons. Broken and egg are abundant, but the over-supply will be quietly worked off, possibly at some concessions from present prices. Considerable inferior coal has been offered and taken at low prices. There is a good deal of inquiry in hand for pea coal, and prices for it are rather firm. The manufacturing demand throughout Eastern Pennsylvania is, if any thing, less active than it was a month ago, and then it was bad enough; there is now no likelihood of any improvement in this direction. Some good orders are coming in from the South. Southern markets will this year absorb their full share of anthracite, although the full demand is not yet coming in, and will not do so for two or three weeks to come. The local and line trades are doing nothing.

Nearly all the bituminous men visited to-day say, "We are doing nothing." In view of the fact that the amount of bituminous coal carried over the Pennsylvania Railroad every week is over 10,000 tons, this statement is rather remarkable. What the shipments would be, were these operators to admit that they were busy, it is hard to imagine; nor is it easy to understand their reasons for making such a "poor mouth" about business. Cars are abundant at nearly all mines, although, from some of the smaller ones, there is some complaint, as usual. Several of the large concerns are running full-handed, and are sending out as much coal to the man as at any time in the past two or three years. Prices are very low, and it is rumored that less has been accepted for coal during the past week or two than ever before in the history of the trade. But it is impossible to corroborate these rumors or to get at any statements as to the sales to which they refer. Some heavy contracts for delivery

at New England and lake ports have been placed, and others are pending; but those who know the most about this business will say the least. Several railroads are extending their contracts for additional supplies.

**Pittsburg.**

May 8.

[From our Special Correspondent.]

The coal trade here is without special change from my last report, so there is really nothing to bring great joy to the operator's heart.

Beginning with the railroad, I find no change in prices, and about all the pits working steadily on lake contracts generally. The supply of cars is becoming better, but is still less than required. For some reason or other, the Pennsylvania Company cars have been going West lately in great numbers, which indicates that there is something special going on outside of the coal trade. Although the pits are working, the trade is light in value and in quantity, not comparing with this time last year or the year previous. All contracts are at the very closest figures, so that there is not much profit even at this busiest season. Why these things are, I leave for some one else to say; but the general stagnation of business no doubt has much to do with the closeness of the bituminous coal trade in this section. The iron mills here and over the country are running light and are taking much less than should be their share. Many mills here have begun working single turn, and some may close entirely before the first of June. What will be the result of the negotiations between the iron-workers and their employers is of the utmost importance to the coal trade, but I can tell you nothing new of their dealings to-day. Now that the tariff agitation has been settled, there can be no excuse for not bringing the negotiations to an end, as the obstacles to be encountered are all in sight. Railroad coal is still quotable at 5½ cents on the wall, and will thus remain for some time to come. There are no labor troubles, because there is work probably for all.

We have had some hard rain that may, by the time the JOURNAL goes to press, give us enough water to let out some coal. I have informed your readers that the run was about over, and now there are but a few small pits at work. There is an aggregate of possibly 10,000,000 bushels of coal loaded in the pools waiting for water to carry them down the river. On Monday, the river was 2 feet 11 inches; on Tuesday, 3 feet 11 inches; and to-day, over five feet, with the prospect of more. Seven feet would let out the light craft, but 10 or 11 feet are needed to carry off all the loaded boats. This we shall not get; but if the lighter craft can get down and some empties be brought back, within two weeks, there may be some resumption of mining. To-day the tugs are getting the barges above the first lock into lower water for local consumption.

Local trade is dull, warmer weather and partly idle river bank mills being responsible. The price is 4½@5½c. wholesale on board. At Cincinnati, stocks are growing scarcer day by day, with prices better. The present quotation is 8 cents a bushel, which a thirty days' dry period will further advance. The Louisville price is 7½ cents, and 30 cents a barrel the New Orleans rate. There are some labor troubles in the fourth pool over a reduction to 2½ cents a bushel, and it is likely this price will be generally posted at the pits in that pool when the start-up begins, with corresponding rates, a half-cent more as by custom, in the lower pools.

Coke may be reported a trifle better in feeling, with no change in prices, which remain as quoted last week. I was rather led astray in saying last week that an increased output would begin. I am told now that such is not the case, and that nothing of the sort can be done until the syndicate meeting, about the 20th inst., which will take such action as it considers proper. The shipments remain at 750 cars a day average.

**Buffalo.**

May 8.

[From our Special Correspondent.]

The anthracite coal trade continues very quiet and without any features of importance to write about. The shipments Westward will be found with this, and the rates of freight. The stocks here are light.

Coke is firm, with upward tendency; at present, rates unchanged.

Bituminous coal is abundant, and trade continues in a demoralized condition; but as your readers are

acquainted with all the circumstances, it is needless for me to comment upon the situation.

The following items may prove interesting until some important subjects come before the trade:

Lake shipments from the opening of navigation to May 8d inclusive, 42,430 tons; 26,460 tons to Chicago, 10,690 to Milwaukee, 1040 to Green Bay, 1010 to Duluth, 1400 to Toledo, 420 to Detroit, and 1410 to ports not specified. From May 4th to 7th inclusive, 25,189 tons; 16,220 tons to Chicago, 1879 to Milwaukee, 700 to Toledo, 5740 to Duluth, and 600 to Racine.

Lake freights: Buffalo to Chicago and Milwaukee, 75c.; to Racine, 85c.; to Toledo, 45c., now 40c.; to Duluth, 90c. now, 80c. offered and 85c. asked; to Green Bay, 75c.

Railroad receipts by Lake Shore & Michigan Southern Railroad for the past week: 384 tons; 216 tons for this port, and 168 tons for other points.

One charter by canal: boat-load coal hence to Syracuse; 85 cents per gross ton. The nominal asking rate to Albany is \$1.10, and to New York \$1.50 per net ton.

The Erie Canal was opened last Tuesday. The channel through to West Troy is in navigable condition, though considerable work has yet to be done, which will be pushed to completion as soon as possible.

The labor trouble on account of the employment of Italians as longshoremen has not resulted in any gain to the Irish element. A large number of policemen have been on duty night and day, and many special constables also, whereby collisions between the opposing parties have been prevented. It is likely that the strong measures taken by our mayor and police officials will prevent bloodshed and incendiarism.

The ice was driven from our harbor on Tuesday last by the strong wind that prevailed. Vessels come and go now without any interruption or trouble.

**Boston.**

May 8.

[From our Special Correspondent.]

The announcement made in last week's issue of the ENGINEERING AND MINING JOURNAL, that competition among two of the leading retailers of Boston was casting a cloud over general trade, is entirely correct. Jobbers find that not only Boston trade, but that trade at many points in New England, is unsettled by the bad state of affairs at the Hub. Retailers in cities within fifty miles of Boston can obtain supplies, say in car lots, really at less cost than they can be had of the wholesale trade. One can easily figure this out for himself. In the wholesale market, Stove coal is still worth, nominally, \$4 at New York; \$3.65 for Broken and Egg. Philadelphia prices are \$3.80 @ \$3.90 for Stove and \$3.40 @ \$3.50 for Broken and Egg. But coal can be had on the wharf in Boston of the competing retailers at \$4.75 for Stove and Nut, \$4.50 for Egg, \$4.25 for Broken. This disturbance, coming, as it does, just at a time when an improved demand from retailers was looked for, is not at all relished by the wholesale trade. Another element has combined to make trade dull. This is the strengthening of freights. Most orders are given at limits which will not allow their shipment until freights decline. The outlook is, therefore, not a particularly promising one.

There is but little doing in bituminous coal. Now and then, small contracts are made. The largest of recent contracts was 10,000 tons taken by a Clearfield operator; also a contract for 2500 tons, also taken by Clearfield parties. As cargo lots are freely taken at \$3.90 delivered, it will be seen that contracts must be taken at very low figures. About \$4.50 is the delivered price on gas-coal contracts with only a light business done.

There is a firmer feeling in freights; but it is believed that rates will not hold up long. It is said that barges will in future ask \$1 from New York. No barges have come around for some time.

New York, \$1 @ \$1.25 per ton; Philadelphia, \$1.20 @ \$1.35; Baltimore, \$1.40 @ \$1.50; Georgetown, \$1.75; Newport News, \$1.85; Richmond, \$1.45; Bay of Fundy, \$1.50; Cape Breton, \$1.90 @ \$2.

During the month of April, the receipts of domestic coal at this port were 159,396 tons, which was a falling off during the month, as compared with April, 1883, of 58,620 tons. During the four months ended May 1st, 1884, the receipts have been 425,458 tons—a falling off of 84,526 tons, as compared with the cor-



responding period of 1883. The decrease has been chiefly in New York and Philadelphia shipments, the former port showing the largest loss. Baltimore, Richmond, and Georgetown only have kept up to last year's record.

Retail trade, as may be judged from the rest of this letter, is in a bad condition. The severe competition has already caused a general decline of 25 cents a ton. The demand is light. It is rather early for the trade to avail itself of a decline in retail figures. Delivered prices are as follows:

White ash, furnace, and egg	\$.50@
" " stove and nut	5.75@
Red ash, egg	6.00@
" " stove	6.00@
Lorberry, egg and stove	6.50@
Franklin, egg and stove	7.25@
Lehigh, furnace, egg, and stove	5.50@5.75
" nut	5.50@5.75

Ohio. May 7.

[From our Traveling Correspondent.]

The trade of Ohio districts continues dull, especially along the Columbus, Hocking Valley & Toledo line. A strike seems imminent among the miners in this region. The Shawnee mines, on the Baltimore & Ohio, seem to be doing better than any other locality in the Hocking Valley. From the reported shipments from Toledo by lake, the Ohio Central mines must be putting out their usual amount. The Lorain & Wheeling line interests, on account of a scarcity of lake vessels, are not as busy as they would otherwise be, but are doing fairly. The operators connected with the Ohio Coal Exchange and the Columbus & Hocking Coal and Iron Company have been enjoying a family jubilee over the failure of the Lick Run property lately leased by Rend. It seems that Rend is considered a kind of dog in the manger in the Hocking Valley, and the Columbus & Hocking Coal and Iron Company had arranged to take the product of his Straitsville mine for the purpose of getting him out of the way, after which he leased what is known as the Lick Run, an old property which has proved, after considerable expense, to have been "worked out." Rend is reported taken by surprise, and is badly disappointed, as he has expended considerable money in reopening the worthless mine; but the operators are rejoicing greatly over his discomfiture, and hoping that he will now confine his operations to the Pittsburg District, where his large interests are, and whose interests conflict as a competitor with the Ohio mines. At a meeting of Hocking Valley operators, largely attended, Rend, it is reported, was the only man who opposed a reduction in the price of mining, and the other operators think that the fact that his (Rend's) interests in Hocking Valley coal are at the tail of the kite, compared with his Pittsburg interests, furnishes the explanation of his opposition to the judgment of the Hocking Valley operators. It is certain that the Pittsburg people have got away this spring with a good deal of what was Hocking Valley trade. Freights on the Lake from Cleveland, Ashtabula, Lorain, Sandusky, and Toledo have been thus far running at 70c. to Milwaukee and Chicago on large cargoes, and 75c. on smaller lots, while \$1.15 to \$1.25 is paid to Port Arthur. Prices on coal continue to rule low, operators realizing from 75@90c. a ton aboard the cars at the mine for the common grades of lump. The reports from the iron and other interests that are the principal consumers makes the outlook for the coal business not very reassuring, to say the least.

Milwaukee. April 30.

[Specially reported by R. P. ELMORE & Co.]

The stocks here of both anthracite and bituminous are pretty well cleared out. The weather has continued raw and cold, and the retail trade for small lots has been quite brisk up to this time.

The price of anthracite at retail for domestic use is held at \$7 a ton; although Coxe Brothers & Co. have been advertising for some time to sell Stove and Nut at \$6.50 and Egg at \$6.25, delivered to consumer.

New Orleans. May 1.

[Specially reported by C. A. MILTENBERGER & Co.]

There have been no interesting features in the coal trade during the past thirty days, prices ruling at the same figures as those last given, while the consumption is but little less than that of the previous

month. No coal of any importance has yet been delivered to the sugar planters this spring. At this time last year, the trade was very active, and the deliveries very general. The crops are somewhat backward, and planters seem loth to lay in their coal supply until further developments are made. Stock on hand about 60 per cent larger than on May 1st, 1883; but the Ohio River is now below boating stage, and the next output from the mines is very uncertain.

RAIL AND CANAL FREIGHTS.

SOUTHERN CENTRAL RAILROAD AND LEHIGH VALLEY AND PENNSYLVANIA & NEW YORK CANAL AND RAILROAD COMPANY'S JOINT COAL CIRCULAR.

No. 51.

AUBURN, N. Y., May 1, 1884.

On and after Thursday, May 1st, 1884, the rate on coal, per gross ton, will be as follows:

WYOMING REGION, IN COAL CARS.	
Fair Haven.	
	Proportion to Fair Haven.
Mines to Fair Haven	\$1.92
Sterling	
	Proportion to Sterling.
Mines to Sterling, for Oswego, and for Rome, Watertown & Ogdensburg Railroad	\$1.90
Weedsport.	
	Through Weedsport.
Mines to Buffalo, Black Rock, Suspension Bridge, Tonawanda, Niagara Falls, and Lockport	\$2.62 \$1.71
To Charlotte Docks	1.93 1.44
Rochester	2.23 1.77
Weedsport, for local points on New York Central & Hudson River Railroad	1.80
Weedsport, for Erie Canal, except Buffalo	1.70
Weedsport, for transfer to Line Cars	1.50
Auburn.	
	Proportion to Auburn.
Mines to Auburn, for Syracuse	\$1.70
" " " local points on New York Central & Hudson River Railroad	1.70
Freeville.	
	Proportion to Freeville.
Caxton to Freeville, for points on Elmira, Cortland & Northern Railroad	\$1.75

RETURNING BOX-CAR RATE.

	Through rate.	Proportion to Weedsport.
Mines to Buffalo, Black Rock, and Suspension Bridge	\$2.32	\$1.45
LEHIGH COAL.—RETURNING BOX-CAR RATE.		
	Through rate.	Proportion to Weedsport.
Penn Haven to Buffalo, Black Rock, and Suspension Bridge	\$2.32	\$1.49
IN COAL CARS.		
Fair Haven.		
	Through rate.	Proportion to Fair Haven.
Penn Haven to Fair Haven	\$2.07	\$2.07
Weedsport.		
	Through rate.	Proportion to Weedsport.
Penn Haven to Charlotte	\$2.07	\$1.64
" " Rochester	2.23	1.77

A charge of 15 cents a ton will be collected of each consignee, on all coal not unloaded within twenty-four hours after its arrival, and an additional charge of 10 cents a ton for every twenty-four hours thereafter (Sundays and legal holidays excepted).

No allowance will be made for coal lost from cars on account of broken doors or other defects existing when the coal is loaded.

Claims for lost coal will be settled with shippers only. Ten cents a ton will be charged at Weedsport docks, for shipping coal directly from cars to boats, and 15 cents a ton additional from stock, making a total charge on what is shipped from stock of 25 cents a ton.

Freight charges to destination via Weedsport and Canal, will at all times be made as low as the rates via Ithaca or Watkins and Canal, to same destination.

JOHN TAYLOR, General Traffic Manager, Mauch Chunk, Pa. HENRY L. RICH, Act'g Gen. Freight Agent, Auburn, N. Y.

Horsford's Acid Phosphate,

A Valuable Remedy for Gravel.

Dr. T. H. Newland, Jr., St. Louis, Mo., says: "I have used it in diseases of the urinary organs, such as gravel, and particularly spermatorrhoea, with very good results, and think it a very valuable remedy in those diseases."

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended May 3d, and year from January 1st:

Tons of 2240 lbs.	1884.		1883.	
	Week.	Year.	Week.	Year.
<b>Wyoming Region.</b>				
D. & H. Canal Co.	99,932	1,102,991	50,142	1,152,483
D. L. & W. RR. Co.	130,255	1,505,441	63,731	1,449,980
Penna. Coal Co.	41,202	362,180	18,134	398,283
L. V. RR. Co.	36,633	435,404	15,417	341,297
P. & N. Y. RR. Co.	5,646	64,581	2,636	63,362
C. RR. of N. J.	*	*	13,553	785,762
Penn. Canal Co.	12,062	42,663		30,872
North & West Br. RR.	12,209	270,108	4,344	169,163
	337,939	3,783,368	167,957	4,391,201
<b>Lehigh Region.</b>				
L. V. RR. Co.	127,666	1,399,576	66,399	1,514,564
C. RR. of N. J.	*	*	22,583	713,841
S. H. & W. B. RR.	3,893	66,788	439	12,089
	131,559	1,466,364	89,431	2,240,494
<b>Schuylkill Region.</b>				
P. & R. RR. Co.	331,373	3,279,656	95,274	2,096,076
Shamokin & Lykens Val.	*	*	26,466	426,335
	331,373	3,279,656	121,740	2,522,411
<b>Sullivan Region.</b>				
St. Line & Sul. RR. Co.	1,245	25,960	999	20,059
<b>Total</b>	<b>802,116</b>	<b>8,555,348</b>	<b>380,127</b>	<b>9,174,165</b>
Increase				
Decrease		618,817		

\* Included in tonnage of the Philadelphia & Reading Railroad.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1879	7,573,795 tons.
" " " " 1880	7,151,235 "
" " " " 1881	8,481,532 "
" " " " 1882	8,058,218 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 53,732 tons, as compared with the corresponding period in 1883.

Comparative Statement of the Production of Bituminous Coal for the week ended May 3d and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.	1884.		1883.	
	Week.	Year.	Week.	Year.
<b>Cumberland Region, Md.</b>				
Tons of 2240 lbs.	68,867	762,412	49,756	681,412
<b>Barclay Region, Pa.</b>				
Barclay RR., tons of 2240 lbs.	6,450	118,813	5,654	117,422
<b>Broad Top Region, Pa.</b>				
Huntington & Broad Top RR., of 2240 lbs.	3,609	65,870	3,416	73,780
<b>East Broad Top</b>				
<b>Clearfield Region, Pa.</b>				
Snow Shoe	609	75,519	4,852	87,642
Tyrene & Clearfield	63,348	984,081	47,174	951,658
<b>Alleghany Region, Pa.</b>				
Gallitzin & Mountain	4,263	130,616	6,122	171,534
<b>Pittsburg Region, Pa.</b>				
West Penn RR.	2,946	103,092	8,460	168,542
Southwest Penn. RR.	5,650	56,379	1,812	43,271
Pennsylvania RR.	7,246	100,147	4,511	180,564
<b>Westmoreland Region, Pa.</b>				
Pennsylvania RR.	24,310	370,672	25,138	476,368
<b>Monongahela Region, Pa.</b>				
Pennsylvania RR.	2,951	56,536		
<b>Total</b>	<b>190,249</b>	<b>2,821,137</b>	<b>156,895</b>	<b>2,951,193</b>
Decrease		127,056		

Comparative Statement of the Transportation of Coke over the Pennsylvania Railroad for the week ended May 3d, and year from January 1st:

Tons of 2000 pounds.	1884.		1883.	
	Week.	Year.	Week.	Year.
<b>Gallitzin &amp; Mountain (Alleghany Region)</b>	2,436	45,150	2,098	42,123
West Penn. RR.	277	21,241	1,802	35,801
<b>Southwest Penn. RR.</b>	41,968	747,115	42,659	676,511
<b>Penn. &amp; Westmoreland Region, Pa. RR.</b>	3,170	66,613	4,483	84,337
<b>Monongahela Penn. RR.</b>	2,625	26,986		
<b>Pittsburg Region, Pa. RR.</b>		136		274
<b>Snow Shoe (Clearfield Region)</b>	50	8,111	579	6,713
<b>Total</b>	<b>50,526</b>	<b>918,352</b>	<b>51,621</b>	<b>845,759</b>
Increase		72,593		

Belvidere-Delaware Railroad Report for the week ended May 3d :

	Week.	Year. 1884.	Year 1883.
Coal for shipment at Coal Port (Trenton)	3,021	12,753	19,435
Coal for shipment at South Amboy	23,428	217,353	290,520
Coal for distribution	18,506	274,027	277,570
Coal for company's use	4,691	64,891	51,133
Total	49,644	568,924	637,658
Increase			
Increase		70,634	

**FREIGHTS.**

**Coastwise Freights.**

Per ton of 2240 lbs.

Representing the latest actual charters to May 8th.

Ports.	From Philadelphia.	From Baltimore.	From Elizabethport, Port Johnston, South Amboy, Hoboken, and Weehawken.
Alexandria	.70@.75		
Annapolis			
Albany			
Baltimore	.60		
Bangor	1.40	1.50	
Bath, Me.	1.25	1.50	1.00
Beverly	1.25		1.00
Boston, Mass.	1.25@1.30	1.40@1.50	.90
Bristol		1.25	.55
Bridgeport, Conn.		1.20	
Brooklyn			
Cambridge, Mass.	1.30		.90
Cambridgeport	1.30		.90
Charleston, S. C.		.70	
Charlestown	1.25		
Chelsea	1.25@1.30		.90
City Point			
Com. Pt., Mass.	1.35		
E. Boston	1.25		.90
East Cambridge	1.25@1.30		
E. Greenwich, R. I.			.80
Fall River	1.15	1.35	.75@.80
Galveston			
Gardiner, Me.			
Georgetown, D. C.	.70@.75		
Gloucester			
Hartford			
Hackensack			
Hudson			
Lynn	1.40	1.50	
Marblehead			
Medford			
Millville, N. J.			
Milton			
Newark, N. J.		1.35	
New Bedford	1.15	1.35	.80@.85
Newburyport		1.70	1.15
New Haven		1.25	.55
New London		1.30	
New-Berne			
Newport			.75@.80
New York		1.15	.18
Norfolk, Va.	.55@.60		
Norwich			.70@.75
Norwalk, Conn.			
Pawtucket			
Philadelphia			
Portland, Me.	1.25	1.40	
Portsmouth, Va.	.55		
Portsmouth, N. H.		1.50	1.05@1.10
Providence	1.15	1.25	.70@.80
Quincy Point	1.30		
Richmond, Va.	.70@.75		
Rockland, Me.			1.00@1.10
Rockport	1.40		
Roxbury, Mass.	1.25		
Saco	1.40		
Sag Harbor			
Salem, Mass.	1.25@1.40		1.00
Saugus			
Savannah		1.15@1.25	
Somerset	1.15	1.30	
Staten Island			
Trenton			
Troy			
Wareham			
Washington	.70@.75		
Weymouth			
Williamsbr., N. Y.			
Wilmington, Del.			
Wilmington, N. C.		1.00	
St. Thomas, W. I.			

\* And discharging. † And discharging and towing. ‡ 3c. per bridge extra. § Alongside. ¶ And towing up and down. † And towing. \*\* Below bridge.

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